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DRAPSA The VEDIC CYCLE OF ECLIPSES

a Key to unlock the treasures of the Vedas

By

MAHAMAHOPADHYAYA, ARTHASASTRAVISARADA,
VIDYALANKARA, PANDITARAJA,

DR. R. SHAMASASTRY, B.A., PH.D.,

*Retired Curator of the Government Oriental Library and
Director of Archæology in Mysore.*

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His Highness Sri Krishnaraja Wodeyar Bahadur, IV,
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PREFACE.

What is ascribed to the Vedic poets in the following pages is not a knowledge of mathematical astronomy which they never had, nor prediction of eclipses with mathematical accuracy which they never did. All that is claimed for them is a knowledge of the famous eclipse-cycle which they seem to have been using in common with the Chaldeans, Israelites, and other contemporary nations. Like those nations they had luni-solar cycles expressed not merely in terms of a thousand and multiples of a thousand days with an intercalary month per thousand days, but also in terms of 5, 17, 19, 20, 30, 33, 57 and 60 years with two intercalary months per cycle of five years. The cycle of 60 years commencing with the year called Prabhava and ending with the year called Akshaya or "Akshayya," as it is spelt in the Taittirīya Aranyaka (1, 1) is split into three cycles of 20 years each. What is called "At̐tāra" and "Ashtāchakra" in the Tait. Ar. is the same as the 20 years cycle with eight intercalary months, presided over by eight suns called Adityas, or sons of Aditi. According to the Vedic poets a Parva consisted of $14\frac{3}{4}$ days and a lunation $29\frac{1}{2}$ days. The fractions such as $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, and $\frac{4}{4}$ after 14 days of a Parva were called Ekapāth, Dvipāth, Tripāth, and Chatushpāth. As the Vedic poets used to count days in terms of syllables of a verse, assigning one syllable to one day, the first three fractions equivalent to one-fourth, two-fourths and three-fourths of a syllable they rightly regarded as inexpressible and four-fourths which is equivalent to one as expressible. This is clearly stated in the following Vedic hymn (A.V. 7, 10, 27).

"Four are the divisions measurable by a syllable and its parts ; those Brāhmans who are wise know them; of them, three divisions are kept in the cave ; and are not utterable ; only the fourth division men express."

In other words one-fourth, two-fourths, three-fourths measuring similar divisions of a day are inexpressible, and only four-fourths equivalent to a complete day is what can be uttered. As pointed out in the following pages, Kali, Dvāpara, Tretā, and Krita were originally the names of Parvas ending in one-fourth, two-fourths, three-fourths, and four-fourths of a day. Five hundred such Parvas or seven thousand days in round number constituted a cycle of eight intercalary months and seventy-one or seventy-two eclipses as a rule. In course of time the cycle of 20 years with eight intercalary months was first reduced to a cycle of 20 or 19 years with seven and half intercalary months (Saptārdhagarbhā Aditih), and then to 19 years with seven Manus. In the Amarakośa one thousand Yugas or Parvas are stated to constitute a Day or Night Kalpa of Brahma and are split into 14 Manu-periods or Manavantaras of seventy-one Yugas each. Thus Manu is a name given to 71 or 72 Parvas with eclipses. It is not only found in the Amara and classical literature, but also frequently met in the Vedas undoubtedly in the above sense, when it is used in connection with eclipses.

The Atharvaveda mentions 10000 Yugas. In the Purāṇas and astronomical Siddhānta works the number of Yugas is invariably stated as twelve thousand. These Yugas, as pointed out above and also in the body of the work, are Parvas with eclipses. Hence if we divide 12000 by 72, we get 166 and $\frac{2}{3}$ cycles of eclipses

called Manvantaras. This multiplied by 20 gives 3333 as the number of years counted from the beginning of the cycle. The number of year-gods counted in the cycle of 33 years is 3339 which is almost the same as the above number. According to Aryabhaṭa the 60 years' cycle made 60 revolutions by about A.D. 500. This means that by A.D. 500 there had elapsed 3600 years in that era and that it began in B.C. 3101. It follows therefore that the other two eras began at the same time and came to a dead stop at about A.D. 242. The cycle of 60 years was alone continued in the name of Kali Era which is still current. Thus the three Vedic Eras are based on astronomical principles. Of these, the Era of Manvantaras is so misinterpreted as to mean 4,320,000 years and converted as a monstrous background for the Kali era and the era of 33 years' cycle passed for a progressively rising number of gods upto 3339 in the S. Yajurveda and 3349 in the Tait. Brāhmaṇa.

As regards the changes made in the number of gods of the 33 years' cycle, it must be noted that the priests in charge of the Vedas are liable to no charge of tampering or meddling with the reading of the Vedic texts. For necessary changes in case-endings, personal pronouns, and numbers in the Mantras or Vedic formulas, as required by time, place, and agent in connection with any rite, are sanctioned under the name "Ūhas," reasonable alterations. Accordingly the number 3339 year-gods mentioned in the S. Yaj. should not be construed as the date of the Sukla Yajurveda. It is merely the date of the change made in the number of the year-gods, but not the date of the formation of the whole text. Likewise the number of 3349 year-gods found in the Tait.

Brāhmaṇa indicates the date of the change made in the number. It does not at all show the date of the formation of the Brāhmaṇa text which is far earlier than that date.

Since composition of verses in praise of Indra and other gods with thousand and other numbers indicative of eclipses is found only in the Samhitas and no new compositions are seen in the Brāhmaṇas, it may be taken for granted that the practice came to a close with the Samhitas. No definite reasons can be given for this sudden stop. It is probable that there arose serious differences of opinion as to the cause of eclipses and the necessity for the performance of sacrifices to appease the wrath of Yakshas or Gandharvas supposed to be the cause of eclipses. It is also probable that in accordance with the law of change in the track of eclipses, the disappearance of an old series and the rise of a new series of eclipses in the course of about 1150 years, there came a new series necessitating some rearrangement in the matter of beginning and closing the cycle, and thus causing some perplexity to the Vedic poets. It is therefore likely that not knowing what to do, the poets stopped there and added no more verses to the Vedas in praise of Indra and other gods for their success in war with Vritra and other demons of eclipses. It is also probable that after some time there came the Brāhmaṇic period when the old sacrifices with the sacrificial songs were regarded as the most sacred models worthy of performance over again and again and for ever. Thus the system became a mere skeleton with no life. The words and the numbers lost their meaning and were recited with no reference to anything like the eclipses and the gods and demons of eclipses, to which they were rightly

applicable. The cyclic numbers were taken to be descriptive of the magnificence of the gods or the mystic virtue of the sacrifices and the light and shade of eclipses were passed for those of day and night. This explains the failure of such celebrated commentators and founders of philosophical systems of sacrificial theology as Yāska, Jaimini, Guru, Bhaṭṭakumārila, and others to rightly interpret the Vedas, notwithstanding their unrivalled learning and monumental works known as the Mīmāṃsādarśana which forms a lifelong study to Sanskrit students now.

But for the clue furnished by ancient Jaina Astronomical works and the Hand-book of Astronomy by Chambers, I could have hardly ventured upon such an interpretation of the Vedas. In interpreting the seven Vedic Metres as Gnomon's shadow-measures of seven ordinary or intercalary months and of the solstices, my chief authority is the Jaina astronomical work entitled the "Kālalokaprakāśa" on the Gnomon's shadow-measure of months and solstices, with which the Vedic metrical shadow-measures are identical. In his letter dated January 1, 1938 Dr. F. W. Thomas, Professor of Sanskrit in the University of Oxford, writes to me on this subject as follows—"I think that you must be quite right in considering the matter of the gnomon, as an interesting lecture by Dr. Lerz, which I heard in Germany in 1936, shows the great importance of the gnomon among early peoples in connection with seasonal observations, the time for planting etc., etc, etc. You have done so much in connection with the earliest Vedic astronomy that you are in a very good position for carrying research further in this field."

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Though I have not read Dr. Lerz's lectures, I think that whatever Dr. Lerz has said on the use of the gnomon to ascertain the arrival and departure of months and seasons in ancient days will support my interpretation of the Vedic Metres and Vishnu's strides in connection with months.

Likewise in my interpretation of 1000 and other Vedic number puzzles as cyclic numbers of luni-solar days and years with to 7 intercalary months of the eclipse cycle, I owe my inspiration to no less an authority than Chambers who, in his Hand-book of astronomy, interpreted exactly similar number-puzzles of the Bible as those referring to the cycle of eclipses and other self-correcting luni-solar cycles. As the numbers in the two works are so identical, I think that there is no likelihood of my having committed any errors in this matter. In other matters connected with these two main themes it is probable that in some cases my views are farfetched and unsupportable. Even if such be the case, it goes without saying that the main themes remain unaffected. Considerations of age and ill-health and consequently hurry to see the work through the press prevented further revisions of the work which was under my consideration for more than 30 years.

It only remains for me to express my thanks to Mr. H. G. Narahari, M.A., for going through the proofs. My heartiest thanks are due to Pandit Kashināthaśāstri, the Proprietor of the Sree Panchāchārya Electric Press, for his kindness in expediting the work and the neat get-up.

MYSORE, }
10—2—1938. }

R. SHAMASAstry.

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ERRATA.

<i>Page</i>	<i>Line</i>	<i>Incorrect</i>	<i>Correct</i>
3	22	Idāvtsara	Idāvatsara
3	30	from	form
5	5	familier	familiar
5	26	Ruth	Roth
6	3	comare	compare
6	5	grammer	grammar
6	17	volums	volumes
8	5	new a	a new
8	7	Calledar	Calendar
8	10	fo	to
8	19	penctuation	punctuation
9	9	busines	business
9	18	putāṇas	purāṇas
10	17	geurdon	guerdon
13	17	Calender	Calendar
17	12	celebrate	celebrate the
		symbolical	symbolical
20	10	त्रयोदसो	त्रयोदशो
21	14	symbolial	symbolical
28	13	Devadasha	Dvādāśāha
39	18	Abhipliva	Abhiplava
40	19	twelth	twelfth
40	22	consists	consist
40	25	tweleve	twelve
40	30	Athervaveda	Atharvaveda
63	8	वा वास्मिन्नन्तर्वी- र्यमिति	वास्मिन्नन्तर्वी- र्यमिति
76	5	discribed	described
76	22	thosand	thousand
78	18	choriot	chariot
80	14	पुत्रैरदिति	पुत्रैरदिति
84	21	evedent	evident

<i>Page</i>	<i>Line</i>	<i>Incorrect</i>	<i>Correct</i>
112	27	Punarrūrja	Punarūrjā
112	20	quinocstial	equinoctial
113	13	motnhs	months
113	24	vernral	vernal
117	5	then	the
117	21	derease	decrease
118	18	Karana	Karāṇa
118	24	unevan	uneven
119	20	Hesce	Hence
123	32	demarkation	demarcation
130	26	Brhmp kalpa	Brahmakalpa
131	17	perfoms	performs
131	20	diference	difference
138	26	says	say
140	24	dimmly	dimly
146	27	Pākayajnyas	Pākayajnas
161	20	यत्त	यत्ते
164	12	spaheres	spheres
164	18	moveable and immoveable	movable and immovable
164	23	colled	called
174	6	diety	deity
190	29	considerstion	consideration
191	26	Jpeshṭha Brama	Jyeshṭha Brahma
192	8	sixt wins	six twins
194	21	speek	speak
194	21	loarned	learned
200	30	granduer	grandeur
204	14	मु परि	मुपरि
209	18	disassociated	dissociated
220	14	discribed	described



INTRODUCTION.

OF all the world's extant literary records, the Vedas have been admitted to be the most ancient and the earliest expression of the thoughts of civilized society. No nation outside the limits of India has been found possessing such old records; nor is it likely that the archæological explorations made in different parts of the world will bring to light any such religious literature. As the earliest expression of human thought, the Vedas have been of inestimable service for the correct conception of the first principles of philology, mythology, and the origin and growth of religion.

Admitted as is the antiquity of the Veda, scholars are still puzzled about its age. The vedic commentators such as Jaimini, Sāyaṇa, Mahīdhara, and others regard the Vedas as cœval with the creation of the world. They hold that the Vedas form part of the Creator's person; that they are manifested or revealed at the dawn of every Creation, and withdrawn into the Creator's body along with the whole world at each destruction of the world; and that the sacrifices and other ritualistic observances enjoined in the Vedas are so many injunctions imposed upon class of the twice-born. But modern oriental scholars, whether Indian or European, regard this theory of revelation as no better than a nursery tale. These scholars are of opinion that, like any other literary work, the Vedas must be a product of civilization and that as civilization itself is of recent growth, the Vedas, as one of its products, must be still more recent. With this conviction, they have

carried on their investigations into the historical records of various nations and founded their conclusions about the chronology of the various kinds of the world's activity on available internal and external evidences. Prof. H. Jacobi,¹ for instance, has found in one of the Ṛigvedic hymns (X, 85, 13) a clear reference to the position of the solstitial colure in Uttara Phalguṇi (♌. Leonis) and Uttara Bhādrapada (♐. Andromedæ), the year beginning with the summer solstice in the rainy season (Ṛig. VII, 193, 9), and thereby determined the age of the Ṛigveda to lie somewhere between 4500 and 2500 B.C. He says:— "This period of civilization extended accordingly from about 4500 to 2500 B.C. and we shall, perhaps, not be far wrong if we put the collection of hymns which has come down to us in the second half of this period." Likewise Prof. B. G. Tilak² has found independently in the Vedas clear references to the shifting of the position of the equinoctial colure from Ardra (♈. Beteigeuze) to Kṛittikas (♊. Tauri) and fixed the Vedic age to be the same as that of Prof. H. Jacobi. But other scholars could not bring themselves to believe that the Hindus of such a remote age were so far advanced in their knowledge of astronomy as to make observations of the positions of the colures. Hence, setting aside the above internal evidence, they had recourse to all available external evidence to determine the age of the Vedas. Taking the beginning of the Buddhistic period (500 B.C.) as the land-mark of Indian chronology, Prof. Max Müller, for instance, divided the previous Vedic period into five parts, the Ṛigvedic period, the Yajurvedic period, the Brāhmaṇic period, the

1. P. 154 Vol., XXIII *Indian Antiquary*.

2. See *Orion* by Prof. B. G. Tilak.

Upanishad period and the Sūtra period ; and allowing about two centuries for the growth of each of the literary periods, he fixed the commencement of the Ṛigveda at about 1500 B.C.

It is really surprising that, while making these and other surmises about the Vedic age, both the mediæval commentators and modern critics, notwithstanding their well-established claim to possess a thorough grasp of the contents of the Vedas, should have utterly failed to notice what the vedic poets themselves professed as their aim. The Vedic poets seem to be counting their years in terms of Yugas of the era of Brahmakalpa, or in terms of the cycle of five years or sixty years, or in terms of the cycle of thirty-three years spoken of as thirtythree gods. In A. V. 8, 2, 21 the poets speak of their intention of making their one hundred, two hundred, three hundred, and four hundred (that is, 1000) Yugas ten thousand years. Expressions such as "tenth Yuga", "three Yugas", or "former Yuga" are frequently met with in the Vedas. As will be seen, the era of Brahmakalpa is counted in terms of Yugas. Samvatsara, Parivatsara, Anuvatsara, Idvatsara, and Idāvtsara are the names of the five years composing a cycle of five lunisolar years and are frequently mentioned in the Vedas (A. V. 6, 55). In A. V. 12, 3, 41 the cycle of sixty years which is a multiple of twelve cycles of five years is clearly mentioned. The thirtythree gods are mentioned in Sukla Yajus. 20, 11; and 20, 36. Of these three eras the first two are still current, not however in their original form, but in a fabulously magnified form given to them by later astronomers of the Siddhānta period. The counting of years in terms of a cycle of thirtythree year-gods fell into

disuse, so much so that about six or seven centuries before the Christian era, scholars were hardly able to give the exact meaning of a number of words of the *Āpri* verses in which the era of the cycle of thirtythree year-gods is enshrouded.

Yāska, one of the Vedic commentators, believed to have lived in the sixth century B.C., "gives the names of no fewer than seventeen predecessors whose explanations of the Veda are often conflicting. The gap between the poets and the early interpreters was indeed so great that one of Yāska's predecessors, named Kautsa, actually had the audacity to assert that the science of Vedic exposition was useless, as the Vedic hymns and formulas were obscure, unmeaning, or mutually contradictory. Such criticisms Yāska meets by replying that it was not the fault of the rafter if the blind man did not see it." ¹

It is needless to say that the few specks of clouds which covered the Vedic horizon at the time of Yāska grew so much thicker and darker by the time of Sāyaṇa that it may be said without the fear of contradiction that, notwithstanding the inestimable service which Sāyaṇa has rendered by his exhaustive commentary embodying the mass of tradition current at his time in the world of Vedic scholars, its value as a genuine interpretation of a number of passages is almost *nil*.

Prof. Roth, the founder of Vedic mythology, "pounded the view that the aim of Vedic interpretation was not to ascertain the meaning which Sāyaṇa, or even Yāska, who lived eighteen centuries earlier, attributed to the Vedic hymns, but the meaning which the ancient

1. P. 61, Prof. Macdonell's *History of Sanskrit Literature*.

poets themselves intended. Such an end could not be attained by simply following the lead of the commentators. For the latter, though valuable guides towards the understanding of the later theological and ritual literature, with the notions and practices of which they were familiar, showed no continuity of tradition from the time of the poets; for the tradition supplied by them was solely that which was handed down among interpreters, and only began when the meaning of the hymns was no longer fully comprehended. There could, in fact, be no other tradition; interpretation only arising when the hymns had become obscure. The commentators, therefore, simply preserved attempts at the solution of difficulties, while showing a distinct tendency towards misinterpreting the language as well as the religious, mythological, and cosmical ideas of a vanished age by the scholastic notions prevalent in their own."¹

"Roth,² then, rejected the commentators as our chief guides in interpreting the *Ṛigveda*, which, as the earliest literary monument of the Indian, and indeed of the Aryan race, stands quite by itself, high up on an isolated peak of remote antiquity. As regards its more peculiar and difficult portions, it must therefore be interpreted mainly through itself; or to apply in another sense the words of an Indian commentator, it must shine by its own light and be self-demonstrating. Roth further expressed the view that a qualified European is better able to arrive at the true meaning of the *Ṛigveda* than a Brāhman interpreter. The judgement of the former is unfettered by theological bias; he possesses the historical faculty, and

1. P. 60, Macdonell's *History of Sanskrit Literature*.

2. P. 63, Macdonell's *History of Sanskrit Literature*.

he has also a far wider intellectual horizon, equipped as he is with all the resources of scientific scholarship. Roth therefore, set himself to compare carefully all passages parallel in form and matter, with due regard to considerations of context, grammar, and etymology, while consulting, though perhaps, with insufficient attention, the traditional interpretations. He thus subjected the Rigveda to a historical treatment within the range of Sanskrit itself. He further called in the assistance rendered from without by the comparative method, utilising the help afforded not only by the Avesta, which is so closely allied to the Rigveda in language and matter, but also by the results of comparative philology, resources unknown to the traditional scholar. By thus ascertaining the meaning of single words, the foundations of the scientific interpretation of the Vedas were laid in the great Sanskrit Dictionary in seven volumes, published by Roth in collaboration with Bohtlingk between 1852 and 1875 "

Valuable as is this dictionary to the scholar of the Vedas, it has so far failed to help the student to proceed a step beyond what is chalked out by Sāyana. The reason is not far to seek. The Vedas abound with a mass of technical terminology of sacrifices which were periodically following the revolutions of the sun and the moon. It is not clearly known at what intervals of time from each other the Vedic poets performed the different kinds of Soma sacrifices, at what recurring periods of time they performed the Horse-sacrifice, of how many years their Yuga consisted, how and when they were periodically adjusting the luni-solar year, and how they kept the account of elapsing years. Unless these and other facts connected with time are clearly understood, no attempt

at an interpretation of the terminology of the periodical sacrifices and of the special deities connected with them can be successful. Sāyana, as is well known, lived at a time when the astronomy of the Hindus had long taken a permanent and, as is belived, unalterable shape with its theory of the four Yugas amounting to 4,320,000 years and when the periodical sacrifices were performed at any time convenient to the sacrificer. His was the time when the Horse-sacrifice as well as the so-called *Sattras* or sacrificial sessions extending over a number of days, usually from 12 to 360 days and upwards, had long disappeared from the list of sacrifices in observance. His was the time when the method of keeping up an account of elapsing years and of adjusting the luni-solar year entirely differed, as will be seen, from what was in use during the Vedic period. Hence his failure to find a satisfactory interpretation of many Vedic words and sentences. Hence also the failure of oriental scholars to arrive at a consistent explanation of Vedic thoughts and myths. What the mediæval commentators termed a theological maxim modern critics style a mythological story. Where the former called in the aid of faith to believe, the later saw superstition. The Vedic poets, for example, now and then speak of the failure of Speech¹ to bring the moon, of the loss a feather or nail sustained by the bird-like Gāyatrī,² a verse of twenty-four syllables, in bringing the moon, and of cows³ sitting at a sacrificial session extending over a number of days. The commentators attribute these and other exploits narrated in

1. Book I, Chapter V, Section 27, *Aitareya Brāhmana*.

2. Book III, Chapter III, Section 25, *Ibid*.

3. Kanda VII, 5, 1, *Krishna Yajurveda*.

the Vedas and Brāhmaṇas to the tutelary gods or goddesses of speech, of metre, and cows, while modern European critics regard these stories as mythological legends, having their origin in the wild imaginations of the poets. Thus new a word, "mythology," is substituted for theology and superstition for faith.

My attempt is to unveil the mystery in which the sacrificial calendar of the Vedic poets is enshrouded, to recover that lost and forgotten era which the poets themselves had invented and continued from 3101 B.C. to about A.D. 500, and to secure thereby a key to explain a number of theological or mythological stories of the pattern mentioned above.

But before proceeding with the subject I have undertaken, it is necessary that I should assure the scholarly public of the stringent precautions which I have taken against the tendency to "put new wine into old bottles." With the help of grammar and lexicons, it is possible, as has been the practice of many scholars, to twist and split words, to alter the punctuation and shape new sentences in order to extract the desired meaning. A simple thought which an ancient singer wanted to convey by his poetry is thus sometimes converted into a profound, philosophical or mystical idea, and a high-soaring, significant utterance is at other times mistaken for childish prattle. Such are the difficulties which beset the interpretation of the Vedic hymns, when the customs, tradition, and mode of thought of the authors of those hymns have long been forgotten.

But such difficulties and risks are foreign to the subject which I propose to discuss at length. It is a subject which is arithmetical in its character and needs,

therefore, no grammatical hair-splitting. The numbers contained in the Vedic passages are plain enough and speak for themselves. What those numbers are, what their purpose, what their basis, and what their aim, is all that I have to point out. Sāyaṇa's interpretation of the Vedas, Prof. Wilson's translation of the Ṛigveda based upon Sāyaṇa's interpretation, Prof. Whitney's literal translation of the Atharvaveda, none of these affects or disproves my theory. My business ends with pointing out what the Vedic poets alluded to and what is the chief purport they meant to convey.

The question of Vedic chronology is not however, of primary importance now. It will solve itself, if only what the Vedic poets held before themselves as the main theme of their songs and sacrifices is clearly understood. The one fundamental theme from which the Vedic sacrificial religion and its myths, the stories of the Epics and the Purāṇas, the Jātaka tales of the Buddhists and the Jainas, the Tāntric cult, and the fairy tales of the Panchatantra, in short, the whole of our Indian culture is derived is the cycle of eclipses. It is accepted on all hands that the cult of sun and moon worship is to a greater extent the source of all religions of the world than feticism or spirit-worship. The periodical recurrence of solar and lunar eclipses with mathematical accuracy added to the growth of the cult in various forms. It gave rise to predictive astrology and to the cult of prophecy of the periodical reappearance of the gods to destroy the demons of eclipses and save themselves and the world from their clutches. The Vedas are nothing but a record of the religious spells performed and the prayers sung to help the gods to free themselves from the demons of eclipses.

Of the two planets, soma, the moon, is regarded as the father and the sun, Sāvitrī, as the mother. Their union on the day of new moon is believed to be the cause of the productivity of the world. The moon is the Chaturmukha-Brahma, the four-faced creator of the animate and inanimate world. He is also regarded as the food of departed souls and also of the gods. Accordingly the Vedic poets feared that in the solar eclipses a new beast or demon might outrage the Sāvitrī and become the cause of mixed blood. This they could not avert and the only course left for them was to make an oblation into the fire with prayer to Agni to cut off the second seed. In the annual ancestral rites such an oblation is even now made. The lunar eclipse is sometimes regarded as the capture of king Soma while hunting in distant forests by wild tribes (*Vyādhas*). Hence Soma-krayaṇa or geurdon is symbolically paid to the Soma-seller for the restoration of the moon. As there are only seven lunar eclipses in each of three divisions of the cycle with seven more in what is called the head (Śīrsha) of the cycle, the geurdons are also only seven. As there are, however, eleven lunar eclipses forming part of eleven Rudra eclipses, there may likewise be eleven or ten Soma-krayaṇas corresponding to the eleven Gandharvas or Soma-captors. Sometimes a solar eclipse is also spoken of as a battle between Indra and Vṛitra or Śambara for Soma liquor. At other times it is spoken of as an act of snatching off the Soma-food of the gods and departed souls by a Kravyāda or a flesh-eating demon. On other occasions the moon is regarded as a woman or a she-goat and the lunar eclipse is described as an attack of the she-

goat by another male-goat or a demon. The captors are either seven hunters in the country of the Daśārṇas; or they are seven wild beasts in the mountain regions of Kālānjana; or they are the Chakravāka birds sucking the moon in the Śara island; or they are seven swans eating the lotus-like moon in the Mānasa lake. Thus numberless are the stories devised to account for the phenomena of eclipses.

The eclipses are also enumerated as eight Vasus, eleven Rudras, twelve or seven Ādityas, fourteen Viśvedevas, or sixty-four kalās or delusive arts of the demons, and the like. The sixty-three Śālāka Purushas of the Jainas with their followers called Yakshas, Gandharvas, and Kinnaras are all so many solar and lunar eclipses recurring in each cycle of eclipses.

This is the subject that I propose to expound in the following pages. As a preliminary thing, however, and for the correct understanding of the subject, I shall deal in the next few chapters with the sacrificial calendar of the Vedic poets, their cycle of luni-solar years with seven or eight intercalary months, and their cycle of Manvantaras on which the cycle of eclipses is mainly based.





THE VEDIC CALENDAR.

The Intercalary Month.

THE term " Vedic Calendar " may appear at the outset to be an anachronism, for the reason that there are no clear references to any kind of calendar in the Vedas proper. Even in the Brāhmaṇas, references to a calendar are so vague that it is hardly possible to form a clear conception of the precise nature of the calendar that was in use. But coming to the Sūtras, especially those of the Sāmaveda, we find precise data to determine the various systems of calendar in observance during the Sūtra period. One might, therefore, be led to think that the term " Sūtraic Calendar " would be preferable to that of " Vedic Calendar." But it should be borne in mind that the various systems of calendar described in the Sūtras are not the result of an observation of the heavens in a day, but are the outcome of the experience gained and adjustments made by many successive calculators of time. Nor are allusions to a calendar altogether wanting even in the Vedas. The description of the New Year's Day as occurring on the Ekāśṭaka day, *i.e.*, the eighth day of the dark half of the month of Māgha (corresponding to December-January) in the times with which we are dealing, as well as the distinct references to a thirteenth month which must necessarily have been an additional month intercalated for the purpose of keeping the beginning of the year more or less close to its natural time, go a long way to prove that the Vedic poets kept a systematised calendar based upon scientific principles.

The beginning of the year on the Ekāśṭaka day is thus described in the Atharvaveda, III 10:—

"(1) It is she that first shone out; having entered into this (*earth*), she goes about; (*like*) a bride, newly married (*to the NEW YEAR*), she has become the generatrix (*of the days that follow*); three are the great lights that associate with her.

"(2) Extolled in metres, these two shining dawns, coming out of the same womb, and being the wives of the sun, go about all-knowing, making a flag, free from old age, and impregnated with abundant seed.

"(3) Three dawns have reached the path of the sacrifice; three lights [the fire, the sun, and the moon] have also approached it; of them, one protects the offspring, one vigour, and one the rite of those who like to please the gods.

"(4) She who is the fourth has passed into the four sets of Sāma-chants [nine-versed, fifteen-versed, seventeen-versed, and twenty-one-versed chants], maintaining the two wings [halves] of the sacrifice [*i.e.*, the year] as known to the sages, and giving rise to the Great Litany composed of Gāyatrī, Trīṣṭubh, Jagatī, and Anuṣṭubh metres; and she has preserved this heaven [the solstice].

"(5) With five (*days*) the Creator has made this; he has also created five and five sisters of them; taking various forms and being clothed in sacrificial splendour, five of them run with great speed.

"(6) Thirty sisters [days] partake of the rite, spreading out the same flag; they make the seasons; being wise and all-knowing and residing in the metres, they go about with great splendour,

"(7) Clothed in splendour, this shining night takes to herself the rites addressed to the sun above ; even the various kinds of beasts, on awaking, see her on the lap of this mother [the earth].

"(8) This eighth day, bearing the troubles of pregnancy, has brought forth this great Indra ; with his help the gods repelled the enemies ; in virtue of his own might, he has become the destroyer of the Asuras.

"(9) O sole Ashtakās, ye gave a sister to me hitherto without a sister ; ye speak the truth ; listen to this prayer ; just as ye are pleased with the behaviour of this (*Indra*), so may ye be pleased with mine ; do not send me away to any one else !

"(10) This all-knowing dawn stepped into my mind and has taken a firm hold of it ; just as ye are pleased with this (*Indra*), so may ye be pleased with me ; do not send me away to any one else ;

"(11) The five mornings, the five milkings, and the five seasons follow the cow with five names ; the five quarters regulated by the fifteen-versed chant and possessed of the same characteristics as the five mornings follow this single light [the dawn].

"(12) (*Of the five mornings*) the first is the womb of the dawn : one bears the magnificence of the waters ; one presides at the rites addressed to the sun ; one presides over the heat ; and one the sun controls.

"(13) She that first shone out has become a cow at Yama's : let her, rich in milk, yield to us each further summer !

"(14) Foremost among the lights, clothed in brilliant splendour, has arrived this illuminating dawn

with various colours, like a flag of the sacrificial fire ; O ever youthful Dawn, conducive to the performance of unchanging rites, and grey with old age, thou hast arrived !

"(15) The wife of the seasons, the first (*Dawn*) has arrived, leading the days and being the mother of creatures; though one, thou hast become many; free from old age, thou causest the rest to grow old."

Likewise the Tāṇḍyamahābrāhmaṇa describes the Ekāshṭaka as the wife of the year:—V. 92.

एषा वै संवत्सरस्य पत्नी यदेकाष्टका. एतस्यां वा गतां रात्रिं वसति. साक्षादेव तत्संवत्सरमारभ्य दीक्षन्ते.

"What is called the Ekāshṭakā (*day*) is the wife of the year; when the night of this day arrives, (*prajāpati*) lies with her. Hence, commencing with the (*true*) beginning of the year, (*sacrificers*) observe the rite of initiation."

The important points to be particularly noticed in the above passages are (1) the beginning of the sacrificial year, probably solar, on the eighth day of the dark half of the month Māgha; (2) the designation of this day by such names as 'a cow,' 'dawn,' 'Prajāpati's daughter,' and 'Sūryā'; (3) the association or a kind of secret marriage of the dawn with three lights, the moon, and the sun, as pointed out by Sāyaṇa in his commentary on verse 1; (4) the birth of the days of the following year or cycle of years, as well as of Indra and Soma from the marriage of the dawn with the sun; (5) the celebration of the dawn by the four well-known Sāma-chants; namely, the nine-versed chant, the fifteen-versed chant, and the twenty-one-versed chant, each of which is, as we shall see, intended to signify as many intercalary days as the

number of verses contained in it ; (6) the destruction of enemies and Asuras brought about by Indra, the son of the dawn.

As regards the first point, it is true that we are told nowhere in the Vedas themselves that the word *Ekāshṭakā* means the eighth day of the dark month of *Māgha* ; still, on the authority of *Āpastamba* and other *Sūtra*-writers, who have defined it as such, we may take it to mean that particular day. From the next three points we have to understand that, at the commencement of every, year, or cycle of years, it was the usual custom with the Vedic poets to celebrate symbolical marriage of the New Year's Day with the sun in order to enable the year to beget its 720 children, ¹ i. e., its days and nights, or, in other worlds, to perpetuate an auspicious flow of time for themselves. This seems to be the sum and substance of the celebrated marriage hymns,² in which the marriage procession of *Sūryā* or the dawn to be wedded to the sun is the subject of a long and mystic description, and which are even now recited on the occasions of marriages performed as a rule after the winter solstice and before summer solstice.

Thus, while the *Yajurveda* connects the mornings and the mystic cows with the *Chatustomas* and makes the number of intercalary days to be twenty-one, the same is distinctly stated as three times seven in the *Sāmaveda*—

तेऽमन्वत प्रथमं नाम गोनाम्

त्रिस्सप्त परमं नाम जानन ।

ता जानतीरभ्यनूषत क्षाः

आविर्भुवन्नरुणीर्यशसा गावः ॥

1 R. V. I, 164, 10, 11.

2 R. V. X, 85 ; and A. V. XIV, 1, 2

"First they (*the sages*) came to know the sacred name of the cows; they came to know the sacred names to be three times seven; knowing them, they extolled the morning (*kshāh*) then the red cows became famous."

There are two more verses which express the same idea—

अयं पुनान उपसो अरोचयत्
 अयं सिन्धुभ्यो अभवदु लोककृत् ।
 अयं त्रिस्सप्त दुदुहान आशिरम्
 सोमो हृदे पवते चारुमत्सरः ॥ Sāma ii, 1 17, 3.
 त्रिरस्मै सप्त धेनवो दुदुहिरे
 सत्यामाशिरं परमे व्योमन् ।
 चत्वार्यन्या भुवनानि निर्णिजे
 चारुणि चक्रे यदृतैरवर्धत ॥ Sāma, vi, 2, 2, 7.

'He, being purified, hath made the mornings shine; and it is he who gave the rivers room to flow: making the three times seven pour out the milky stream, Soma, the cheerer, yields whatever the heart finds sweet."

"The three times seven milch-kine in the loftiest heaven have for this Soma poured the genuine milky draught; four other beauteous worlds hath he made for his adornment when he waxed in strength through holy rites."

We find clear referenes to a thirteenth intercalary month not only in the Yajurveda and the Atharvaveda, but also in the R̥igveda. The R̥igveda I, 25, 8, thus alludes to the intercalary month:—

वेद मासो धृतव्रातो द्वादश प्रजावतः । वेद य उपजायते ॥

"He, who, accepting the rites (*dedicated to him*), knows the twelve months and their productions, and that which is supplementarily engendered."

In his translation of the *R̥gveda*, Professor H. H. Wilson remarked as follows—

"वेद य उपजायते, who knows what is *upa*, additionally or subordinately produced. The expression is obscure, but in connection with the preceding, वेद मासो द्वादश, who knows the twelve months, we cannot doubt the the correctness of the scholiast's conclusion, that the thirteenth, the supplementary or intercalary month of the Hindu luni-solar year, is alluded to; that 'the thirteenth or additional month which is produced of itself, in connection with the year,' 'यत्त्रयोदशोऽधिमास उपजायते संवत्सरसमीपे स्वयमेवोत्पद्यते'." The passage is important, as indicating the concurrent use of lunar and solar years at this period and the method of adjusting the one to the other."

Notwithstanding Sāyaṇa's interpretation of the word *upajāyate* in the sense of 'a supplementary month,' it is doubtful whether the word indicates a complete intercalary month or an intercalated period less than a month; for we shall presently see that along with the custom of adjusting the lunar and solar reckoning by the addition of a complete month, there was also the practice of adjusting them, by adding as many days as formed the difference between any two kinds of years or sets of years. Still, it is certain that some sort of intercalation, either in the form of a month or in the form of a period less than a month, is what is implied in the above

verse of the R̥igveda. But coming to the Atharvaveda, we see therein a clear description of a thirteenth intercalary month—

अहोरात्रैर्विमितं त्रिंशदं त्रयोदशं मासं यो निर्मिमीते ।
तस्य देवस्य क्रुद्धस्यैतदागो य एवं विद्वांसं वाह्यं जिनाति, ॥

"He who mesuars the thirteenth month, fabricated of days and nights, having thirty members—against that god, angered, is this offence." A. V., XIII, 3. 8.

सनिस्त्रसो नामासि

त्रयोदसो मास इन्द्रस्य गृहः ।

"Weakling by name art thou, the thirteenth month, Indra's house." A. V., v. 6. 4.

In the Kṛishṇa Yajurveda, I. 4. 14, the twelve months together with a thirteenth intercalated month are thus enumerated :—

मधुश्च माधवश्च शुक्रश्च शुचिश्च नभश्च नभस्यश्च इषश्चोर्जश्च
सहश्च सहस्यश्च तपश्च तपस्यश्चोपयामगृहीतोऽसि संसर्पोऽसि अंह-
स्पत्याय त्वा.

"Thou art the month of Madhu,⁵ the month of Mādhava, the month of Śukra, the month of Śuchi, the month of Nabhas, the month of Nabhasya, the month of Isha, the month of Ūrja, the month of Sahas, the month of Sahasya, the month of Tapas, and the month of Tapa-sya; and thou art caught hold of in a wooden vessel; thou art the month Samsarpa [a creeping month]; and thou art the receptacle of sins."

5 Madhu corresponds to Chaitra; Mādhava to Vaiśākha; and so on.

The Brāhmaṇa portion contained in the Kṛishṇa-Yajurveda, vi. 5, 3, 12, comments on this passage as follows :—

प्रसिद्धमेवाध्वर्युर्दक्षिणेन प्रपद्यते प्रसिद्धं प्रतिप्रस्थातोत्तरेण. तस्मा दादित्यष्वणमासो दक्षिणेनैति षडुत्तरेण उपयामगृहीतोऽसि संसर्पोऽस्य हस्पत्याय त्वेत्याहास्ति त्रयोदशो मास इत्याहुस्तमेव तत्प्रीणाति.

“Clearly does the Adhvaryu first go to the south ; clearly the Pratiprasthātri priest to the north. Hence does the sun go to the south for six months. He says : ‘Thou art caught in a wooden vessel’ ; thou art Saṁsarpa [a creeping month] and a receptacle for sins.’ They say that there is also a thirteenth month ; it is that thirteenth month which he pleases thereby.”

The symbolical practice connected with this passage is this—The adhvaryu priest fills thirteen vessels with Soma-juice ; and with the help of another priest, called Pratiprasthātri, he makes offerings therefrom to the seasons. While performing the rite, the Adhvaryu goes to the south and the Pratiprasthātri to the north, imitating the southern and northern movements of the sun respectively. As will be seen, it was in the middle of the year, during the summer or the winter solstice, according as the year began with the winter or the summer solstice, that the intercalary period was inserted, delaying the sun’s turning movement so long and occupying that period in performing the initiatory rites. Hence the reference in this passage to the sun’s northern and southern movements, and to the thirteenth month during which the commencement of those turning movements is delayed. The fact of representing the months by Soma-vessels is clearly stated in the Maitrāyaṇīya-Saṁhitā, iii, 10. 4. 5.

द्वादश पात्राण्युपांशुसवनस्त्रयोदशं यत्त-
न्मीमांसते पात्राउन्नपात्रामिति मीमांसते
हि त्रयोदशं मासं मासाउन्नमासाउ इति.

"Twelve are the vessels; the pressing stone, called *Upāṁśusavana*, is the thirteenth; the discussion they hold, whether there ought to be a vessel or no vessel (*to represent a thirteenth month*) is a discussion as to whether there is a thirteenth month."

Regarding the sacrificial function observed during a thirteenth month, the *Tāndyamahā Brāhmaṇa*, X, 3. 2, says—

पिता नोऽरात्सीदिति माता उपासीदन् । ते दीक्षयैवाराध्नुवन् ।
उपसत्सु त्रयोदशमदीक्षयन् । सोऽनुव्यमभवत् । तस्मादुपसत्सु
दिदीक्षाणोऽनुव्यं भवत्येव च हि त्रयोदशं मासं चक्षते नैव च.

"The months observed the vow of *Upasads* [sessions] with the intention that their father [the year] might prosper. They, however prospered merely by observing the initiatory rites, and initiated the thirteenth month during the period of the vow of *Upasads* [session]. Therefore the thirteenth month became their follower. Hence whoever undergoes the rite of initiation during the period of the vow of *Upasads* [sessions] becomes the follower (*of the rest of the priests*). Accordingly they declare a thirteenth month as existent and also as non-existent."

Again, the *Maitrāyaṇīya-Samhitā* i. 5. 5. 6, says—

अग्नीषोमीयया त्रयोदशी उपस्थेयोऽस्ति.

मासस्त्रयोदशः तमेवैतयाप्त्वावरुंधे.

"The thirteenth lunar day is to be propitiated by the immolation of a beast sacred to Agni and Soma. There

is thirteenth month ; it is that thirteenth month which he catches hold of by this offering."

These and other references to the New Year's Day and the thirteenth month intercalated solely for the purpose of keeping the seasons or the month in their proper places in the year, are enough to show that the Vedic poets kept a calendar with far more scientific precision than we are pleased to credit them with. Whether we will or no, the fact cannot be denied that the idea of a thirteenth month, *i.e.*, an intercalated month, could not have dawned upon the mind of the Vedic poets unless they had been quite familiar with the true lengths of several kinds of years. There is also reason to believe that, before the system of adjusting the difference between any two kinds of years by the insertion of an intercalary month was begun, the practice was to adjust them by adding sets of intercalary days, such as 9, 11, 12, 21, and so on. That such was the custom, is clear from the following passage of the *Kaṭhaśākhā-Brāhmaṇa*, quoted in the *Smṛititattva*.⁶

अर्धमासा वै अधस्तात्संतः अकामयत मासास्स्यामेति. ते द्वाद-
शाहं क्रतुमुपायन् त्रयोदशं ब्राह्मणं कृत्वा तस्मिन् मृष्ट्वा उदतिष्ठन्
तस्मात्सोऽनायतनः इतरानुपजीवतीति तस्माद्द्वादशाहस्य त्रयोदशेन
ब्राह्मणेन भवितव्यमिति कठशाखाब्राह्मणम्.

अस्यार्थो जयस्वामिना व्याख्यातः—

ते चार्धमासास्त्रयोदशं मलमासं ब्राह्मणं कृत्वा द्वादशाहं क्रतु-
मुपायन् उपाहृतवन्तः तस्मिन्मलमासे मृष्ट्वा संमार्ज्यं किमित्या-
कांक्षायां अरातीरित्यभ्याह्वियते अरातीः पापानि संमार्ज्यं उदतिष्ठन्.
पापभारशून्या उत्थिता अभवान्नित्यर्थः तत्र पापनिर्मार्जनार्थवादात्

6 *Smṛititattva*. Calcutta ed., 1895, p. 782.

सम्भवत्कालानंतरं कर्म तत्र न कर्तव्यम् न तु निरवकाशमिति. अर्क-
वादात् विधीकल्पनायाः प्रतीतिवाधेनैवौचित्यात्. अतो नित्यनैसि-
क्तिकांशान्तिकादेः मलमासेन पर्युदासः सोऽनायतन इति नाव्यस्य
चैत्रादिवत् प्रतिनियतस्थानमित्यर्थः इतरानुपजीवतीति मासांतरेषु
चन्द्रक्षयवृद्धिभ्यः. तस्योपजननात्.

" Being at a lower level [*i.e.*, being less than a month].
the half-months desired that they might grow into months.
They approached the twelve days' sacrifice. Having
appointed a Brāhmaṇa as a thirteenth priest [in addition
to the twelve priests] and having washed off (*the sins*)
on him, they got up. Hence it is that he [thirteenth
month or the priest who represents it] is homeless and
dependent for his existence upon others. Hence there
ought to be a thirteenth Brāhmaṇa priest in every twelve
days' sacrifice. This is a passage from the *Brāhmaṇa* of
the Kāṭha School.

" This passage is thus commented upon by
Jayasvāmin—Having represented the thirteenth 'dirty'
month by a Brāhmaṇa priest, those half-months collected
the twelve-days' sacrifice, [*i.e.*, converted it into a month's
sacrifice]. Having wished off in that 'dirty' month,—
if it is asked what was that which they washed off on the
'dirty' month, we have to understand the word *arāli*,
'enemies';—having washed off the enemies, *i.e.*, the sins,
they got up, *i.e.*, they rose up free from the burden of sin.
From the descriptive statement of washing off the sins,
it follows that the sacrificial performance which can
possibly be observed in the subsequent month should
neither be undertaken during the 'dirty' month nor be
given up. The inference of a rule from a descriptive
statement is reasonable in as much as the sense

of the descriptive statement can otherwise have no application whatever.⁷ Hence the performance of obligatory, casual, expiatory, and other religious rites is prohibited in a 'dirty' month. It is homeless, *i.e.*, like Chaitra and other months, it has not a fixed place of its own in the year. 'Dependent for its existence upon others, *i.e.*, the thirteenth month comes into existence owing to the waxing and waning of the moon in the intervals of months.'

The meaning of the above passage is this—Giving up a practice of adding twelve days to the synodic lunar year of 354 days in order to adjust it to the sidereal solar year of 366 days, the Vedic poets allowed the twelve days to accumulate to the extent of a month in the course of two and a half years, and then performed their sacrifice at the close of the thirteenth month with thirteen priests, of whom the thirteenth priest represented the thirteenth month, the 'dirty' month and took up the sins of the sacrificer for the gold that was presented to him.

In the *Aitaréya-Brāhmaṇa*, i, 12, the thirteenth priest is called Soma-vikrayin, 'seller of Soma.' This passage, with a brief commentary upon it by Raghunandana Bhaṭṭāchārya, the author of the *Smṛititattva*, runs as follows⁸—

प्राच्यां दिशि वै देवाः सोमं राजानमक्रीणंस्तस्मात्प्राच्यां दिशि
क्रीणते त्रयोदशान्मासादक्रीणंस्तस्मात्त्रयोदशो मासो नानुविद्यते पापो
हि सोमविक्रीयीति. अस्यायमर्थः

⁷ Here the rule is that the sacrifice should neither be performed in the 'dirty' month nor be given up, but should be performed in the subsequent month. The statement is that of washing off the sins in the dirty month.

यतोऽधिमासस्सोमविक्रयी अतोऽसावितरमासवन्नानुविद्यते.
विद्यमानोऽपि कर्मानर्हत्वादसन्निवेत्यर्थः सोमविक्रय्यपि ऋत्वि-
गन्तरवत्.

"The gods bought the king Soma in the eastern direction. Thence he is (*generally*) bought in the eastern direction. They bought him from the thirteenth month. Thence the thirteenth month is found unfit (*for any religious work to be done in it*); a seller of Soma is (*likewise*) found unfit (*for intercourse*), for such a man is a defaulter." The meaning of the passage is this—"Because the intercalated month is the seller of Soma, therefore it has no proper existence like other months. Although it has its own existence, it is yet regarded as having no proper existence inasmuch as no rites are performed in it. The seller of Soma is like other priests employed for the performance of sacrifice."

As regards the sinful nature of intercalated months, the author of the *Smṛititattva*, quotes the following passage^o—

वत्सरांतर्गतः पापः यज्ञानां फलनाशकृत् ।
नैर्ऋतैर्यानुधानाद्यैस्समाक्रांतो विनामकः ॥

इत्यादि ज्योतिश्शास्त्रे.

विरुद्धनामको विनामकः कुतः मलिम्लुचादिनामकत्वात्.

"(*The intercalated month*) contained in the body of the year, is sinful, is destructive of the good results of sacrifices, is infested by Nairṛita, Yātudhāna, and other evil spirits, and is of a disagreeable name. This and other passages are found in astrological works. The word *vināmaka* means 'that which has a disagreeable

name'; for it has Malimlucha and other (*disgusting*) names."

The three passages quoted above throw a flood of light on the nature of the conception which the Vedic poets entertained regarding the intercalary days and months. We have to understand the three important points specified in these passages—

(1) At first the Vedic poets used to adjust their lunar year with the sidereal solar year by adding twelve days to the former, but in course of time they gave up that custom and began to intercalate one month to every third lunar year.

(2) Instead of performing any sacrifice during the intercalated period, they spent that period in performing such accessory rites as are called *Upasads* or sessions and *dīksha* or rites of initiation.

(3) They regarded the intercalated days as being infested by evil spirits and enemies. It is therefore probable that the apparent acts of sorcery undertaken in connection with every kind of sacrifice in order to drive out or to destroy 'those who hated the poets and whom the poets hated,' are acts intended to symbolise the fact of getting rid of an intercalated period. Since an intercalated period is regarded, not only as being burdened with dirt or sin, but also as being infested by Varuṇa, Nirṛti and other good or evil spirits with nooses in their hands to bind their victims, it is probable that, during an intercalated period, the Vedic poets regarded themselves, not only as being burdened with sin but also as being bound with the noose (*pāśa*) of Varuṇa or Nirṛiti.

8 *Smṛitilattva*, p. 782.

9 *Idid*, p. 778.

It also follows that the removal of sin or of Varuṇa's fetters at the close of a period of twelve or twenty-one days, is a technical expression of the Vedic poets implying the intercalary nature of those days. The removal of guilt at the close of the twelve intercalated days is thus referred to in the *Aitareya-Brahmaṇa*, IV. 4, 24—

त्रयश्च वा एते ज्यहा आदशममहराद्वावतिरात्रौ यद्वादशाहो
द्वादशाहानि दीक्षितो भवति. यज्ञिय एव तैर्भवति द्वादश रात्री
रूपसद उपैति. शरीरमेव तामिधुनुते. द्वादशाहं प्रसूते धृत्वा शरीरं
धृत्वा शुद्धः पूतो देवता अप्येति. य एवं वेद. षट्त्रिंशदहो वा एष
यद्द्वादशाहः ।

"The Devādasāha consists thrice three days together with the tenth day and two Atirātra days. After having undergone the ceremony of initiation during twelve days one becomes fit for performing the sacrifice. During the twelve days he undergoes the *Upasad* or the vow of fasting. By means of them he shakes off all guilt from his body. He who has such a knowledge becomes purified and clean, and enters the deities after having, during (*these*) twelve days, been born anew and shaken off (*all guilt*) from his body. The Dvādasāha consists (*on the whole*) of thirty-two days."

The thirty-six days referred to in this passage are three sets of twelve days each, constituting the difference between three lunar and sidereal solar years. The *Atharvaveda*=(Rig. V. VII. 103. 1.) IV. 15. 13, also speaks of the twelve day's vow as follows—

संवत्सरं शशयाना ब्राह्मणा व्रतचारिणः ।

वाचं पर्जन्यजिन्वितां प्रमंङ्गका अवादिषुः ।

"Having lain for a year, (*like*) Brāhman preforming a vow, the frogs have spoken forth a voice quickened by *parjanya* [the raining clouds]."

So also the same says IV. 11. 11—

द्वादश वा एता रात्रीर्व्रत्या आहुः प्रजापतेः ॥

तत्रोप ब्रह्म यो वेद तद्वा अनडुहो व्रतम् ॥

"Twelve, indeed, they declare those nights of the vow of Prajāpti; whoso knows the Brahma whithin them—that verily is the vow of the draught ox."

The release from Varuṇa's fetters at the close of twenty-one days is thus referred to in the *Atharvaveda*, IV. 16. 6—

ये ते पाशा वरुण सप्त सप्त वेधा तिष्ठन्ति विषिता रुशंतः ।

सिनन्तु सर्वे अनृतं वदंतं यः सत्यवद्यति तं सृजन्तुं ॥

"What fetters of thine, O Varuṇa, seven by seven, stand triply relaxed, shining—let them all bind him that speaks untruth; whoso is truth-speaking, let them let him go."

I presume that the expression of three times seven milch kine pouring their milky draught, as referred to in the two verses of the *Sāmaveda* (vi. 2, 2, 7) implies the same idea as that of an intercalation of twenty-one periods. From the consideration of these and other similar passages too numerous to be quoted here, we may conclude that expressions such as 'the milking of the kine,' 'the destruction of the evil spirits or of enemies,' and 'the release from the fetters of Varuṇa or of Nirṛiti,' are Vedic expressions implying the passing off of an intercalated period.

It appears that the number of days intercalated differed with different schools of Vedic astronomers, and depended upon the difference between any two kinds of years selected for adjustment with each other. The school which had adopted the synodic lunar year of 354 days seems to have added to every lunar year a *Dvādaśāha* or period of twelve days, during which they performed a sacrifice with recitation of a *Sāma*-chant of twelve verses on the last day. With the school which had adopted the sidereal lunar year of 351 days, *i.e.*, the year of thirteen months of 27 days each, and adjusted it with the *Sāvana* year of 360 days, the number of days added was nine. In this way there seems to have been during the Vedic period a variety of different astronomical schools, whose chief religious function was the performance of a grand sacrifice during each period of their respective intercalary days. A regular account of the 'cows' or intercalary days which each school counted and observed is found preserved under the general title of *Gavām-Ayana*, "the walk of cows or intercalary periods." The term *Gavām-Ayana* seems to have been originally intended to be a name of only the intercalary days; but in course of time it appears to have also been used to signify that year which contained intercalary days added to it, no matter whether the number of days so added, or counted as having been added, amounted to a year or more than a year. These and other important points connected with the Vedic calendar are clearly explained both in the *Nidāna-Sūtra* and in the *Śrauta-Sūtra* of *Lāṭyāyana*.

The passage of the *Nidāna-Sūtra* in which a few forms of *Gavām-Ayana* inclusive of the 3 years cycle are defined, runs as follows, v, 11, 12 :—

10 अथातस्संवत्सरा वर्गाणां. पंचसंवत्सरा वर्गाः 11 तेषु धीरो मनीषया कर्मण उपसदो विद्यात् संस्था वा एषु व्रतानि च. पदत्रिंशोनो नवोनश्च षडहोनोऽथ सावनोऽष्टादशभिर्ज्यायानहोभिः सावनात्परो नाक्षत्रमिति मासश्च तस्य चैव त्रयोदश. चांद्रमस-स्सावनश्चोभावथाष्टादश्युत्तनोऽष्टा सप्तत्रिंशते पौर्णमास्यां प्रसाधयेत् ।

गवामयनस्योपायांश्चतुरः प्रतिपादयेत्. तेषां नाक्षत्रः प्रथम-स्तस्य सप्त विंशिनो मासाः सप्तविंशतिर्नाक्षत्राणीति. तस्य कल्पः प्रथमस्य प्रथमस्याभिप्लवस्य स्थाने त्रिकद्रुकज्यहं कुर्यात्प्राग्विषुवत उत्तमस्योत्तमस्योर्ध्वं. विषुवतः ते खल्वभिप्लवतन्त्र एव क्लृप्ताः स्युरित्येके. एते चाधिकृता न चापि निवर्तयत्यथापि दृश्यते ज्यहस्यह-तन्त्रे क्लृप्तो यथा स्वरसामानस्त्रिकद्रुकपंचाहश्चाभिप्लवतन्त्रे. सप्तदश-रात्रे । स्वरतन्त्रा इत्यपरम्. एवं च तन्त्राविलोपः अपि च सत्रेषु त्रिकद्रुकज्यहः स्वतन्त्रो भवति.

अथ नवोनस्तस्यैवं त्रयोदश मासाः संभार्ययोर्मासयोर्नवाहं लुंषे चतुरहमेव प्राग्विषुवतः पंचाहमूर्ध्वं तस्य कल्पः प्रथमस्याभिप्लवस्य स्थाने ज्योतिषं च गां च कुर्यात्प्राग्विषुवत ऊर्ध्वं विषुवत उत्तमस्या-भिप्लवस्य स्थाने ज्योतिषं नात्र विषुवानभिभवत्युत्तरेऽत्र पक्षसि विषु-वानुपसंख्यायत इति.

अथ षड्नाश्चांद्रमसाः षट्पूर्णापक्रमाः ऊनावसानाः पूर्वे पक्षसि मासास्स्युः ऊनोपक्रमाः पूर्णावसाना उत्तरे. तस्य कल्पः प्रथमस्य प्रथमास्याभिप्लवस्य स्थानेऽभिप्लवपंचाहं कुर्यात्प्राग्विषुवत ऊनेषु मासेषु उत्तमस्योत्तमस्योर्ध्वं विषुवतः ।

10. From पंच° to सावनात्परो (for 'रः')—and perhaps farther—seems to be a metrical quotation from some other work; with one or two words separated, and one omitted.—J. F. Fleet.

11. *Varga* is not fairly to be rendered by 'cycle.' Cycle is *yuga* or *chakra*: *varga* is a 'group, class.'—J. F. Fleet.

व्याख्यातस्सावनः । स एष आदित्यसंवत्सरो नाक्षत्र आदित्यः
खलु शश्वदेतावद्भिरहोभिर्नक्षत्राणि समवैतित्रयोदशाहं त्रयोदशाहं
मेकैकं नक्षत्रमुपतिष्ठत्यहस्तृतीयं च नवधा कृतयोरहोरात्रयोर्द्वे
कले चेति. सांवत्सरास्ताश्चतुष्पञ्चाशतं कलाः ते षण्णववर्गाः स
षट् षष्टिर्त्रिंशतः षष्टिर्त्रिंशते । श्लोकौ भवतः—

सप्तविंशती राष्ट्रस्य राष्ट्रो वसतयो मिताः ।

त्रयोदशाहं त्रयोदशाहमेकैकं नक्षत्रमुपतिष्ठति ॥

त्रयोदशाहानि तृतीयं महश्चतस्रस्त्रेधा दशतयो वि कुर्वन् ।

त्रिणवं पन्थानं विततं पुराणं चत्वारिंशता नवरात्रैः समश्नुते ॥ इति.

अथाष्टादशभिर्ज्यायानादित्यसंवत्सर एव तैर्यग्यनिको भवति.
आदित्यः खलु शश्वदेकदा षण्मासानुदङ्ङेति नव चाहानि तथा
दक्षिणा. तदप्येते श्लोका भवन्ति :—

यस्मिन्वै परिवत्सरे

सौम्यो मासोऽथ चांद्रमासो ।

नाक्षत्रो न विलुप्यते

कस्स्वित्तं वेद कस्स्वित् ॥

अष्टासप्तत्रिंशते तस्मिन्

संवत्सरे मिते ।

सौम्यो मासोऽथ चांद्रमासो

नाक्षत्रो न विलुप्यते ॥

सप्तविंशतिमेवैष सप्ताहानेति दक्षिणा ।

तथोदङ् सप्तविंशतिमिति ॥

तस्य कल्पः संभार्ययोर्मासयोरष्टादशाहान्युपाहरेन्नवाहमेव
प्राग्विषुवतः नवाहमूर्ध्वं त्रिकद्रुकांश्चाभिप्लवं च प्राग्विषुवतोऽभिप्लवं
च त्रिकद्रुकांश्चावृत्तानूर्ध्वं विषुवतः ।

Then the years of the class: the classes (*are*) of the five years. In them the sage by his wisdom will know the sessions of the ritual,¹² and the basic form (of the *sacrificial rites*),¹³ and the vows *or* ceremonies (*to be observed*) in them.

“(The year) which is less (*than the Sāvana year*) by 36 (*days*); that which is less by 9 (*days*); that which is less by 6 (*days*); then the Sāvana year (*of 360 days*); then the year which is greater than the Sāvana year by 18 days. The sidereal year (*of 351 days*) has a thirteenth month (*of 27 days*). Then the two kinds of years: the lunar and the Sāvana. Then the year which is greater than the Sāvana year by 18 days: one has to observe (*it*) on every 38th or 37th full-moon.

He has to know the four forms of Gavām-Ayana. Of them, the sidereal year (*of 324 days*) is the first; its months are of 27 days each, because there are 27 *Nakshatras*. The mode of observing it (*is this*): in the place of each first [period of six days called] *Abhiplava* (*of every month of 30 days*) before the central day (*of the year*), one should observe [a period of only three days known as] *Trikadruka*:¹⁴ (*likewise in the place*) of each last (*Abhiplava*) after the central day. Some say that

12. *Upasad* : lit. ‘the sitting down, waiting for the arrival of the final sacrificial day.’

13. *Samsihā* ; lit. a staying or abiding together.’

14. *Trikadruka* is the name given to a unit of three days of which the first day is called *īyotis*, ‘light,’ the second *go*, ‘cow’ and the third *āyus*, ‘life.’ *Abhiplava* is the name given to a unit of six days, of which the first three days are named like the *Trikadruka* days and the last three days are called *go*, *āyus*, and *īyotis*.

they (*the Trikadruka days*) are so devised as to be of the same form as the (*Abhiplava days*; they have their place here; nor is their observance opposed to that of the *Abhiplava days*. It is also known that, like the *Svarasāman days*,¹⁵ the unit of three days [*the Trikadruka days*] is devised as a special period of three days. The three *Trikadruka days*, as well as the five days of the six *Abhiplava days* are observed together in the sacrificial session of seventeen nights. Others say that the *Trikadruka days* are the same as the *Svarasāman days*. And thus the usual form of the calendar days and their rites is not lost; for the *Trikadruka days* have their own independent place in all sacrificial sessions.

"Then (*the year of 351 days*) which is less (*than the Sāvana year*) by nine days:¹⁶ thus it has months (*each of 27 days*). He has to omit nine days in the two intercalary months [*sambhārya*; *i.e.*, the sixth and the seventh month, each of 30 days]; four days (*are to be omitted*) before the central day of the year, and five days after it. This is how it is done: in the place of the first *Abhiplava* (*of the sixth month of 30 days*) before the central day, only two days known as *jyotis* and *go*, are to be observed; and in the place of the last *Abhiplava* (*of the seventh month*) after the central day, only one day, known as

15. *Svarasāman* is a name given to the three days before and after the central day of a sacrificial session. Special *Sāma*-chants are sung on these six days. If the *Trikadruka days* were considered as identical with the *Svarasāman days*, which are strictly observed immediately before and after the central day of a sacrificial session, the other days of the session would be counted in periods of six days each. This appears to be the meaning of 'an independent place for the *Trikadruka days*.'

16. See Calendar, Form II. below.

jyotis, is to be observed. No central day occurs in the year (of 351 days); for it is counted in its later half.

"Then the lunar years (of 354 days) which are less (*than the Sāvana year*) by six days:¹⁸ in the first half (*of this year*) there are six months, beginning with one which is full [*i.e.*, consists of 30 days] and ending with one which is deficient [*i.e.*, contains only 29 days]; in the latter (*half there are six months*), beginning with one which is deficient and ending with one which is full. This is how it is observed: in the deficient months before the central day, in the place of each first *Abhiplava* one should observe (*only*) five days of *Abhiplava*; (*likewise in the place*) of each last (*Abhiplava*) in the deficient months after the central day.

"The Sāvana year (of 360 days)¹⁹ has been explained. It is this same sidereal year of the sun.²⁰ The sun is known to pass through (*each of*) the *nakshatras* in a fixed number of days: he remains in each *nakshatra* for thirteen days, together with a third part of a day and two out of nine *kalās* or parts of a day-and-night [*i.e.*, of a whole day]: these *kalās* or parts amount in a year to 54, and

18. See Calendar, Form II, below.

19 See Calendar, Form I., and for the year of 366 days, see Form IV. below.

20 The text treats here in a somewhat obscure manner of *both* the Sāvana year of 360 days *and* the sidereal solar year of 366 days. The latter is not mentioned as one of the five classes of years in the beginning of the passage. The text seems to suggest that the Sāvana year, before being regarded as $= 30 \text{ days} \times 12$, was a sidereal year of $27 \times 13\frac{1}{3}$ days, and that the year of 366 days, $= 27 \times 13\frac{2}{3}$, was a refinement of it, as a result of experience showing that the sun required $\frac{2}{3}$ of a day more time to pass through each *nakshatra*.—J. F. Fleet.

are equal to six times nine *kalās* [*i.e.*, 6 days]: thus it consists of 366 (*days*) as contrasted with the (*Sāvāna year*) consisting of 360 (*days*). There are two verses about this:—

“ ‘Twenty-seven are the mansions in the king’s [*i.e.*, the Sun’s] dominion; thirteen and thirteen days he resides in each *nakshatra*: thirteen days and one-third of a day; thus dividing four times ten days into three (*equal*) parts, he traverses the broad and ancient path of thrice nine stations in the course of forty periods, each of nine nights.’

“Then the year of the sun (of 378 *days*)²¹ which is greater (*than the Sāvāna year*) by eighteen days; this indeed is made by his transverse motion;²² it is well known that the sun always goes to the North for six months and nine days, and likewise to the south. Accordingly there are following verses—

Who knows that year in which the solar, the lunar, and the sidereal months are not lost, who knows that? In the year measured by 37 or 38 (*full-moons*), the solar, lunar, and the sidereal months are not lost. The sun goes to the South for twenty-seven times seven days.

“This is how this year is observed—In the two intercalary months,²³ one should intercalate eighteen days; nine days before the central day of the year and nine days after it; three *Trikadrūka* days and six

21 See Calendar, Form III. below.

22 The motion from South to North and back again, which the sun seems to have in passing from solstice to solstice, is transverse, at right angles, to his actual motion from West to East through the *nakshatras*.—J. F. Fleet.

23 See Note 18, above.

Abhiplava days before the central day, and six *Abhiplava* and three *Trikadruka* days after the central day."

Similar forms of calendar, together with some more varieties, are also described in the *Śrauta-Sūtra* of *Lāṭyāyana* iv. 8, 1—7.—This is what he says—

ज्योतिषामयन विकल्पाः । तत्र यदादितोऽन्ततस्तदूर्ध्वं विषुवतः । मासि मास्याद्यस्याभिप्लवस्य स्थाने विकद्रकाः । स षट्त्रिंशद्वृत्तौ नाक्षत्रस्सप्तविंशिनो हि मासाः । षष्ठाद्यस्याभिप्लवस्य स्थाने ज्योतिर्गौश्च ज्योतिरेवावृत्ते स नवोनो नाक्षत्र एव त्रयोदशी युग्ममासेष्वाद्यस्याभिप्लवस्य स्थाने तत्पंचाहः स षड्वनश्चांद्रमसः । षष्ठादौ त्रिकद्रकानाभिप्लवं चोपदध्यात् सोऽष्टादशाधिकः पौर्णमासीप्रसवस्तैर्यग्यनिक आदित्यस्य ।

"Varieties of the movements of the heavenly luminaries. In the calendar pertaining to these movements, that which is observed at the beginning (of *each month*) before the central day, is observed at the close (of *each month*) after the central day. In the place of the first six *Abhiplava* days in each month, only three *Trikadruka* days are observed. Thus this sidereal lunar year is less (*than the Sāvana year*) by 36 days, since its months consist of 27 days each.

"In the place of the first six *Abhiplava* days of the sixth month (of *the Sāvana year*), there are observed only two days, known as *jyotis* and *go* and in the second part of the year, which is merely a repetition of the first part, only one day, known as *jyotis*, is observed in the place of the last six *Abhiplava* days (of *the seventh month*); thus it is less (*than the Sāvana year*) by nine days, and is a sidereal year having a thirteenth month."⁴

24 See Calendar, Forms I and II.

"In the place of the first six *Abhiplava* days in all the even months, only five *Abhiplava* days are observed; this is less (*than the Sāvāna year*) by six days, and is lunar."²⁵

"In the beginnig of the sixth month, one should intercalate three *Trikadrūka* days and six *Abhiplava* days;²⁶ thus it is greater (*than the Sāvāna year*) by 18 days, and is productive of a full-moon; and it is caused by the transverse motion of the sun."²⁷

Besides the three forms of calendar mentioned above, which are similar to those described in the *Nidāna-sūtra*, a few more varieties also are noticed in the *Lāṭyāyana Śrauta sūtra*. As some of these varieties are referred to, though only briefly, in the *Kṛishṇa-Yajurveda*, it can not be said that they existed during the Vedic period, and that they are not the later contrivances of Sūtra writers. It is therefore necessary that we should understand them as clearly as possible. The *Lāṭyāyana-Sūtra* continues in iv. 8, 8-20:—

उत्सर्जनानि मासि मासि । यथाऽन्त एवमावृत्तानामादिः ।
पूर्वेष्वभिप्लवेषु षष्ठमहरुक्थ्यं कृत्वाऽग्निष्टोममुत्तमे । तद्वैकत्रिक
स्तोमम् । सवनविधं पशुं कुर्वन्नुत्तममभिप्लवपंचाहं कृत्वा षष्ठस्थाने
सवनविधः पशुः । प्रथमं चाभिप्लवं पंचाहं कृत्वा मासांते सवन
विधः दशुः । सर्वानूनानेके प्रथममभिप्लवपंचाहं कुर्युः । अहनी वा
समस्येयुरभिप्लवपृष्ठययोः सन्निपातके । अभिप्लवयोरुत्तमे । तथा
सत्येकादश्यां पूर्वपक्षस्य दीक्षित्वा त्रयोदशदीक्षाः कुर्वीरन् । सप्त
दश वा । व्यत्यासं वा पूर्णोनानूनपूर्णानावृत्तान् शालंकायनिना ।

25 *Ibid*, form III.

26 That is, nine days before the central day and nine days after it.

27 See Calendar, Form IV.

" Omissions (of *days*) month after month.²⁸ Just as the last day (*in each month in the first half of the year*) is omitted, so the first day (*in each month*) in the repeated part of the year [*i.e.*, the second part] is omitted. Having treated as *Ukthya* days the sixth day in each of the three *Abhiplava* periods of six days, they observe the sixth day of the last *Abhiplava* [*i.e.*, the fourth *Abhiplava*] as an Agnishtoma day.²⁹

" On the sixth day of the fourth *Abhiplava* period of each month, they have to recite a set of Sāma-verses called *Ekatrika*.³⁰ In view of immolating a sacrificial animal, they make the last (*i.e.*, the fourth) *Abhiplava* consist of only five days, and immolate a sacrificial animal on the sixth day. Having made the first *Abhiplava* consist of only five days, they immolate a sacrificial animal at the close of the month. Some teachers make all the months deficient by one day: they make the first *Abhiplava* of each month consist of only five days.³¹ At

28 This is what is called *utsargiṇām ayanam*, which is described in the *Krishṇa-Yajurveda*, VII. 5, 6.

29 It should be noted here that according to this school a month is made to consist of four *Abhiplavas* of six days each and a *Prishṭhya* of six days closing the month. According to the commentary of Agnisvāmin on this sūtra, it is the *Ukthya* days that are omitted. Accordingly, three days are omitted in each month, thus making it consist of 27 days. See Calendar, Form V. below.

30 Agnisvāmi quotes a passage on the authority of which the day with the *Ekatrikastoma* is omitted. Hence, according to this school, the month seems to consist of only 20 days. See Calendar, Form VI. below.

31 See Calendar, Form VII. below.

the junction of *Abhiplava* and *Prishṭhya* days,³² they reckon the last day of the (*fourth*) *Abhiplava* period and the first day of the *Prishṭhya* as one day [*i.e.*, they treat the two as a single day]. In the last month [*i.e.*, the twelfth month], they make the last day of the last but one *Abhiplava* the first day of the last *Abhiplava*.³³ If so [*i.e.*, if they omit one day in each month of the year] they should undergo the vow of initiation for their sacrifice on the eleventh day of the bright half of the month, and spend thirteen days in vow (before they perform their sacrifice on the fourteenth, *i.e.*, the *Ekāśṭakī* day of the dark half of the month). Or they have to spend seventeen days in vow.³⁴

32 Like *Abhiplava*, *Prishṭhya* is also a name given to a period of six days which are called: (1) Rathantra, (2) Bṛhat, (3) Vairūpa, (4) Vairāja, (5) Śākvara, and (6) Raivata, after the names of the Sāma-verses recited on those days. In some schools the last six days of each month are observed as *Prishṭhya*.

33 The twelfth month, when recast in the form of *Gavām Ayana*, consists of three *Abhiplavas* of six days each and a period of *Dvādasāha* or twelve days. In order to make this month also consists of 29 days, they make the last day of the second *Abhiplava* the first day of the third *Abhiplava*. See Callendar, Form VIII.

34 As each month of the year is made to consist of 29 days (total 348), the deficiency in the year amounts to twelve or seventeen days according as we take the Sāvana year of 360 days or a solar year of 365 days for comparison. It is clear, therefore, that the twelve or seventeen days regarded as *Dikshā-days* are not other than intercalary days required to make up the year in observance. Compare *Aitareya-Brāhmaṇa*, iv. 4, 24; and *Alhara* veda, iv, 11, 11; iv, 16, 6, quoted above.

Calendar—Form I.

[Abbreviations: J=*jyotis*; G=*go*; A=*āyus*.]

Savana Year of 360 days.

1st Month.

				J.	G.	Ā.	G.	Ā.	J.
Abhiplava I	....	....		1	2	3	4	5	6
„ II	....	....		7	8	9	10	11	12
„ III	....	....		13	14	15	16	17	18
„ IV	....	....		19	20	21	22	23	24
„ V	....	....		25	26	27	28	29	30 ¹

¹ Similarly the other eleven months.

² In order to convert this Sāvana year into the sidereal lunar year of 351 days, the last four days of the first Abhiplava of the 6th month and the first five days of the last Abhiplava of the 7th month are omitted.

N.B.—Instead of being called *Abhiplava*, the last week in each month seems to have been called by others, as *Prishṭhya*, the days being named Rathantara, Bṛihatī, Vairūpa, Vairāja, Śākvara, and Raivata respectively.

Calendar—Form II.**Sidereal Lunar year of 351 days.¹****Calendar—Form III.****Synodic Lunar year of 354 days.****1st Month.**

			J.	G.	Ā.	G.	Ā.	J.
Abhiplava I	....	....	1	2	3	4	5	6
" II	....	....	7	8	9	10	11	12
" III	....	....	13	14	15	16	17	18
" IV	....	....	19	20	21	22	23	24
" V	....	....	25	26	27	28	29	30

2nd Month.

			J.	G.	Ā.	G.	Ā.	J.
Abhiplava I	....	....	.....	1	2	3	4	5
" II	....	....	6	7	8	9	10	11
" III	....	....	12	13	14	15	16	17
" IV	....	....	18	19	20	21	22	23
" V	....	....	24	25	26	27	28	29

1 See Note 2, Page 41.

2 Similarly the other months, omitting the first day in the 4th and 6th months, and the last day in the 7th, 9th, and 11th months.

Calendar—Form IV.

Sidereal year of 366 days with an intercalation of 18 days.

1st Month.

			J.	G.	A.	G.	A.	U.
Abhiplava I	....	....	1	2	3	4	5	6
„ II	....	....	7	8	9	10	11	12
„ III	....	....	13	14	15	16	17	18
„ IV	....	....	19	20	21	22	23	24
Prīṣṭhya I	....	....	25	26	27	28	29	30 ¹

6th month.

	J.	G.	A.	G.	A.	J.	J.	G.	A.
Abhiplava I	1	2	3	4	5	6	7	8	9
„ II	10	11	12	13	14	15	.....	.....	.....
„ III	16	17	18	19	20	21	.....	.....	.....
„ IV	22	23	24	25	26	27	.....	.....	.....
„ V	28	29	30	31	32	33	.....	.....	.....
„ VI	34	35	36	37	38	39*	40	41	42
„ VII	43	44	45	46	47	48	.....	.....	.....

¹ Likewise the 2nd, 3rd, 4th and 5th months, and also the months from 7 to 12.

Calendar—Form V.

			1	2	3	4	5	6
Abhiplava I	....	....	J.	G.	A.	G.	A.	U.
„ II	....	....	J.	G.	A.	G.	A.	U.
„ III	....	....	J.	G.	A.	G.	A.	U.
„ IV	....	....	J.	G.	A.	G.	A.	Agni
Prishṭhya I	....	....	R.	B.	V.	Vr.	S.	Rai.

J=gyotishtoma; G=Goshtoma A=Āyushtoma; U=Ukthya.

Note—Similarly the other months, only *Prishṭhya*, taking the place of the first Abhiplava in the second half of the year.

Calendar—Form VI.

			1	2	3	4	5	6
Abhiplava I	....	....	J.	G.	A.	G.	A.	J.
„ II	....	....	J.	G.	A.	G.	A.	J.
„ III	....	....	J.	G.	A.	G.	A.	J.
„ IV	....	....	J.	G.	A.	G.	A.	Eka- trika
Prishṭhya I	....	....	R.	B.	V.	Vr.	S.	Rai.

1 This day is not counted; similarly the other months.

Calendar—Form VII.

			1	2	3	4	5	6
Abhiplava I	....	....	J.	G.	A.	G.	A.	J.
„ II	....	....	J.	G.	A.	G.	A.	J.
„ III	....	....	J.	G.	A.	G.	A.	J.
„ IV	....	....	J.	G.	A.	G.	A.	J.
Prishṭhya I	....	....	R.	B.	V.	Vr.	S.	Rai.

Calendar—Form VIII.

Month 11			1	2	3	4	5	6
Abhiplava I	....	....	J.	G.	A.	G.	A.	J.
„ II	....	....	J.	G.	A.	G.	A.	J.
„ III	....	....	J.	G.	A.	G.	A.	J.
„ IV	....	....	J.	G.	A.	G.	A.	J.
Prishṭhya I	....	....	R.	B.	V.	Vr.	S.	Rai.

Calendar—Form VIII.

Month 12.				1	2	3	4	5	6
Abhiplava I	....	....		J.	G.	A.	G.	A.	J.
„ II	....	....		J.	G.	A.	G.	A.	J.
„ III	....	....		J	G.	A.	G.	A.	...
The Dvādaśāha	....	{		R.	B.	V.	Vr.	S.	Rai.
				C ¹	C ²	C ³	C ⁴	M.	U.

1 C¹ to C⁴=Four Chandoma days ; M=Mahāvṛta ; U=Udayaniya days

Calendar—Form IX.

The Savana year with twenty-one intercalary days inserted between the sixth and seventh months.

6th Month				J.	G.	Ā.	G.	Ā.	J.
Abhiplava I	....	....		1	2	3	4	5	6
„ II	....	....		7	8	9	10	11	12
„ III	....	....		13	14	15	16	17	18
„ IV	....	....		19	20	21	22	23	24
Prīṣṭhya days	....	....		25	26	27	28	29	30

Abhijit	Six Prīṣṭhya days							Three svarasama days			Central day	Visva-jit	Three svarasama days			Six Prīṣṭhya days				
1	2	3	4	5	6	7	8	9	10		11	12	13	14	15	16	17	18	19	20

7th Month of Calendar Form IX				J.	G.	Ā.	G.	Ā.	J.
Abhiplava I	....	....		1	2	3	4	5	6
" II	....	....		7	8	9	10	11	12
" III	....	....		13	14	15	16	17	18
" IV	....	....		19	20	21	22	23	24
Prishthya days	....	....		25	26	27	28	29	30

Names for the different kinds of years as suggested by Dr. J. F. Fleet :

324 = 27 × 12	...	"Sidereal lunar year of 324 days."
351 = 27 × 13	...	"Sidereal lunar year of 351 days."
354 = 30 × 6 + 29 × 6	...	"Synodic lunar year."
360 = 30 × 12 or 27 × 13½		The best possible term for this is the original one, "Sāvāna year."
366 = 27 × 13½	...	"Sidereal solar year"
378 = 189 + 189	...	"Pseudo-solstitial year of 378 days."
365	...	"Vague solar year."
365½	...	"Julian solar year."—This term involves an anachronism but it is customary and explains at once what is meant.

This is a portion of the article that appeared with Dr. J. F. Fleet's notes in I. A. 1913.

CHAPTER II

THE CYCLE OF FIVE YEARS.

THE nature of the five-years cycle is explained in the *Maitrāyaṇīya Saṃhitā* itself. The passage (1. 10, 8) in which it is described runs as follows:—

प्राणेभ्यो वै ताः प्रजाः प्राजायंत. प्राणा वा एतानि न हवींषि नव हि प्राणाः आत्मा दैवता ततः प्रजायते. नव प्रयाज नवानुयाजा द्वा आज्यभागा अष्टौ हवींष्यग्नये समवद्यति. वाजिनो यजति. तत्रिंशत्. त्रिंशदक्षरा विराट्. विराजेव प्रतितिष्ठति. विराजो वै योनेः प्रजापतिः प्रजा असृजत. विराजो वा एतद्योने र्यजमानः प्रजायते. त्रिंशत्रिंशद्वै रात्रयो मासः. यो मासः संवत्सरः. संवत्सरः प्रजापतिः. तत्प्रजापतेश्च वा एतद्विराज्योनेर्मिथुनाद्यजमानः प्राजायत. एकैकया वा आहुत्या द्वादश द्वादश रात्रीर्युवत. ता यावतीः संख्याने तावतीः संवत्सरस्य रात्रयः संवत्सरमेव भ्रातृव्याद्युवते. वैश्वदेवेन चतुरो मासोऽयुवत. वरुणप्रघासैः परांश्चतुरः. साकमेधैः परांश्चतुरः. तानेव भ्रातृव्याद्युवत. ऋतुयाजी वा अन्यश्चातुर्मास्ययाज्यन्यः. यो वसन्तोऽभूत्प्रावृडभूच्छरदभूदिति यजते स ऋतुयाजी. अथ यस्त्रयोदशं मासं सम्पादयति त्रयोदशं मासमभियजते स चातुर्मास्ययाजी ऋजूंस्त्रीनिष्ट्वा चतुर्थमुत्सृजेत. ऋजू द्वौ परा दृष्ट्वा तृतीयमुत्सृजेत. ये वै त्रयस्संवत्सरास्तेषां षट्त्रिंशत्पूर्णमासाः यौ द्वौ तयोश्चतुर्विंशतिः. तद्येऽपि षट्त्रिंशत्याधि तानस्यां चतुर्विंशत्यामुपसम्पादयति एष वाव स त्रयो मासः तमेवैतत्सम्पादयति. तमभियजते. वैश्वदेवेन यजेत पशुकामः न वरुणप्रघासैर्न साकमेधैः. सर्वो वै पुरुषः साहस्रो जायते यावत्तरसं त्वेवैति. प्रजननं वा एतद्धविर्यद्वैश्वदेवं. यद्वैश्वदेवं यजते प्रजननाय वा एतद्यजते स्वां मात्रां गच्छानीति. स यत्सहस्रं पशूंगच्छेदथ वरुणप्रघासैर्यजते. यदेवादः सहस्रमगंस्तस्यै तदंहोऽवयजति.

M. S. I, 10, 8

From vital' breaths are those creatures born. Vital breaths are these nine oblations, for nine are the Vital breaths. Ātmā [the inner man] is the deity. From him (*the deity*) is (*the sacrificer*) born. Nine fore-offerings, two butter portions, and eight oblations, he puts together for Agni. He makes the oblation of curdled milk (*vājina*). That amounts to thirty. The Virāt metre consists of thirty syllables. By means of the Virāt, he has a firm footing; for Prajāpati created the creatures from the womb of Virāt. From this womb of Virāt is also the sacrificer born. Thirty and thirty nights are a month. That which is the month is the year. Prajāpati is the year. From the womb of the couple, Prajāpati and Virāt, is the sacrificer born. With each oblation he inserts twelve and twelve nights. There are, when counted, as many oblations as there are nights in a year. He separates the year from the enemy. With the Vaiśvadeva sacrifice he inserts four months; with the Varuṇapraghāsa sacrifice, the next four months; with the Sākamedha sacrifice, the next four. These are the months which he has separated from the enemy. He who sacrifices for the seasons is one, while he who sacrifices for the four months is another. He who sacrifices for the reason that that which was the spring has become the rains, and that that which was the rainy season has become the autumn, is a sacrificer for the seasons. But he who gains a thirteenth month, and sacrifices for that thirteenth month, is the one who sacrifices for the four months. Having sacrificed for three regular (*months*), he should omit the fourth; and then having sacrificed for the next two regular (*months*), he should omit the third. What are counted as three

years, there are in them thirty-six full moons; what are counted as the next two, there are in there twenty-four. Those (*days*) which exceed (*an intercalary month*) in thirty-six full moons, he puts in (*the next*) twenty-four full moons. This is, verily, that thirteenth month. This is what he gains and sacrifices for. He who is desirous of cattle should observe the Vaiśvadeva sacrifice, but neither the Varuṇapraghāsa nor the Sākamedha. All the Puruṣa amounts to a thousand when counted together as far as the flesh-oblation (*Tarasa*). The oblation made in the Vaiśvadeva sacrifice is, verily, the birth (*of creatures*). The reason for which he sacrifices with the Vaiśvadeva is the birth of creatures for which he sacrifices with the thought that he may attain his own measure. When he comes by a thousand cattle, then he should sacrifice with the Varuṇapraghāsa. When he comes by a thousand of this, then he gets rid of his sin by means of sacrifice."

Omitting the sacrificial technicalities with which the above passage abounds, we may confine our attention to that portion of the passage where a distinction is drawn between the Season-sacrificer and the Four-monthly sacrificer, and where the nature of the three Four-monthly sacrifices, the Vaiśvadeva, the Varuṇapraghāsa and the Sākamedha is clearly defined. It is clear from this passage that during the Vedic period there were two important schools of priestly astronomers, the Season-sacrificers and the Four-monthly sacrificers. Of these two schools, one seems to have been observing the lunar year of 354 days without adjusting it to the solar or sidereal year, and to have allowed it to fall back by 11 days in every year and to regain its original initial point

at the close of 32 or 30 years, making a full rotation through the seasons. This is what is meant by the expression that what was the spring became the summer, and that what was the summer became the autumn. The priests who were sacrificing for such rotating seasons are called Ritu-yājins'. The other school of sacrificers called the Chātur-māsyāyājins, 'Four-monthly sacrificers' did not, like the Season-sacrificers, allow the year to fall back for want of intercalation, but adjusted their lunar year of 354 days to the sidereal year of 366 days by adding two months in five years or four months in ten years. From the reference made to twelve days in the beginning of the passage, it is clear that it is the sidereal year of 366 days that is taken for adjustment with the lunar year of 354 days. Accordingly the extra days in three lunar years amount to thirty-six days, *i.e.*, one month and six days, says the author, are to be added to the twenty-four days of the subsequent twenty-four full-moons or two years. From the statement that whoever gains a thirteenth month is a Four-monthly sacrificer, it is clear that the three Chātur-māsyas or Four-months are undoubtedly three intercalary periods of four months each. I have pointed out in my *Vedic Calendar* how the vedic poets regarded the intercalary days or months as enemies and as sinful periods infested with demons. This is what the writer means when he says that the sacrificer has to separate the Chātur-māsyas, the Four-months, from the enemy. What is meant by the expression that Purusha amounts to a thousand will be explained later on in connection with the Purusha hymn.

It appears that when the three Four-monthly periods were got rid of by intercalation, the Vedic poets used to

renew their sacred fire by churning anew. This idea is conveyed in the following passage of the *Maitrāyaṇīya Samhitā* (I. 10, 7):—

त्रेधा विहितानि चातुर्मास्यानि. संवत्सरं वै चातुर्मास्यानि संवत्सरेणार्गिन मन्थति.

"Three are the Four-monthly sacrifices to be performed. To a year (*amount the three*) Four-monthly periods. In such a year [*i.e.*, once in thirty years] the sacrificer churns the fire [*i.e.*, sets up the sacrificial fire again]."

It is not to be understood that the Vedic poets were adjusting the lunar year to the sidereal year by intercalating four months once in ten years alone. Since a thirteenth month is frequently mentioned in the *Vēda*, we may believe that they were adjusting the years once in two and a half years, when one intercalary month occurs. It is, therefore, certain that whenever a thirteenth month is mentioned, half a cycle of five luni-solar years is meant. The following passage of the *Maitrāyaṇīya Samhitā* (I. 5, 6) refers to a thirteenth month and the form of the sacrifice performed in it:—

जीर्यति वा एष आहितः पशुर्हन्तिः. तदेतान्येवाग्न्याधेयस्य हवींषि संवत्सरे संवत्सरे निर्वपेत्. तेन वा एष न जीर्यति तेनैव पुनर्णवं करोति. तन्न सूक्ष्मम्. एताभिरेवाग्नेयपावमानीभिः अग्न्याधेयस्य याज्यानुवाक्याभिरुपस्थेयः. तेन वा एष न जीर्यति. तेनैव पुनर्णवं करोति. द्वादशभिरुपतिष्ठते द्वादश मासाः संवत्सरः संवत्सरमेवाप्त्वावरुन्धे. अग्नीषोमीयया त्रयोदश्युपस्थेयोऽस्ति मासस्त्रयोदशः तमेवैतयाप्त्वावरुन्धे.

"When once set up, he becomes old ; for Agni is (*like*) a beast. Hence he should offer, year after year

these oblations of the Agnyādheya rite. He does not thereby grow old. The sacrificer renews him thereby. This (*way of renewing the fire*) is not well-considered. The sacrificer should simply praise the fire with the Yājya and Anuvākya hymns called Āgneya-pāvamāni, used in the Agnyādheya rite. Thereby he does not become old. Thereby the sacrificer renews him. The sacrificer praises him with twelve verses, for there are twelve months in the year. Thus he catches hold of the year and keeps it. He is to be praised with a thirteenth verse dedicated to Agni and Soma, for there is the thirteenth month also. With this verse he catches hold of that month and keeps it."

Since the Atharvaveda (V. 6, 4) assigns the thirteenth month to Indra (त्रयोदशो मास इन्द्रस्य गृहः), ("the thirteenth month is the home of Indra,") we shall not be wrong in considering Indra also as one of the chief deities worshipped in a thirteenth month. The following passage of the *Maitrāyaṇīya Saṁhitā* (II. 1, 3) furnishes additional evidence about the same fact:—

अग्नीषोमाभ्यां वै वीर्येणेन्द्रो वृत्रमहन्. स ओजसा वीर्येण
व्यार्धत्. स एतमैन्द्राग्रमपश्यत्. तेन ओजो वीर्यमात्मन्नयत्.

"Indra killed Vṛitra with the power of Agni and Soma. Hence he grew with brightness and strength. He saw the power of Agni also. Thereby he kept brightness and strength in himself."

The connection of Vṛitra with Agni and Soma, the gods of an intercalary month, will be explained later on. That intercalary months were being observed, either singly or in sets of two, three, or four months, is clear from the following passage of the *Maitrāyaṇīya Saṁhitā* (I. 11, 10):—

वसवस्त्रयोदशाक्षरया त्रयोदशं मासमुदजयन्. रुद्राश्चतुर्दश-
क्षरया चतुर्दशं मासमुदजयन्. आदित्याः पञ्चदशाक्षरया पञ्चदशं
मासमुदजयन्. अदितिषोडशाक्षरया षोडशं मासमुदजयत्.

"The Vasus conquered the thirteenth month with a verse of thirteen syllables. The Rudras conquered the fourteenth month with a verse of fourteen syllables. The Adityas conquered the fifteenth month with a verse of fifteen syllables. Aditi conquered the sixteenth month with a verse of sixteen syllables."

Since in this passage a year of 12 months is referred to before speaking of the thirteenth, fourteenth, and other months, I take them to be of an intercalary nature. There is no reason to believe that the Vedic poets were counting thirteen or sixteen ordinary months in a year, though they were acquainted with the luni-solar cycle of 5 years, as pointed out above. The following passage of the *Maitrāyaṇīya Samhitā* (I. 10, 5) leaves no doubt that Indra is a god of an intercalary month :—

देवाश्च वा असुरश्चास्मिंल्लोके आसन्. स प्रजापतिरकामयत्
प्रासुराबुदेय प्रजाः सृजेयेति. स चातुर्मास्यान्यपश्यत्. चातुर्मास्यैव
सोऽसुरान्प्राणुदत् चातुर्मास्यैः प्रजा असृजत्. तद्य एवं विद्वांश्चातु-
र्मास्यैर्यजते प्र भ्रातृव्यं नुदते प्र प्रजया च पशुभिश्च जायते अग्नि-
ष्टोमाद्वैश्वदेवं यज्ञकृतं निर्माय प्रजापतिः प्रजा असृजत्. उक्थ्या-
द्वरुणप्रघासान्यज्ञकृतं निर्मायेमाः प्रजा वरुणेनाग्राहयत्. अतिरात्रा-
त्साकमेधान्यज्ञकृतं निर्मायैन्द्रो बृत्रमहन्. सृष्टाः वा अन्याः प्रजाः
आसन्नसृष्टा अन्याः अथ प्रजापतिरकामयत् प्रजास्सृजेयेति.
संवत्सरो वै यज्ञो यज्ञः प्रजापतिः स एते पयसी आत्मन्नधत्तोधन्
च बाह्यं अथैताभ्यो देवताभ्यो एतानि हवींषि भागं निरवपत्. ते
प्रजा असृजत्. ऋतुभ्यो वै ताः प्रजाः प्राजायन्त. ऋतवो वा
एतानि पञ्च हवींषि.

M. S. I. 10, 5

"The Devas and the Asuras were in this world together. Prajāpati desired that he might drive out the Asuras and create children. He looked to the 'Four-months;' for it is by the 'Four-months' that he drove out the Asuras and created children. Whoever, knowing thus, performs the sacrifice of 'Four-months,' will drive out his enemy and get both children and cattle.

"Creating the Vaiśvadeva sacrifice on the model of the Agnishtoma, Prajāpati created children; and creating the Varuṇa-praghāsa sacrifice on the model of the Ukthya, he put these children under the clutches of Varuṇa. Creating the Sākameda sacrifice on the model of the Atirātra sacrifice, Indra killed Vṛitra. The children that were created became of one kind, while those that were not created became of another. Then Prajāpati desired that he might create children. The year is the sacrifice, and sacrifice is Prajāpati. He kept in himself this pair, the year and the sacrifice, (*like two kinds of*) milk, that which is produced from the udder and that which is external. Then to these gods he offered the following oblation as a share, and created children from them: from the seasons were those children born. The seasons are the five oblations."

From this passage we can understand the technical sense in which the words *Dēva*, *Asura*, and *Prajās*, are commonly used in the Vedas. In the terminology of the Vedic poets the name of the ordinary days of a year is *prajāh*, 'children.'¹ I have pointed out in my notes in the *Vedic Calendar*, how the Vedic poets regarded the intercalary months as Asuras, demons. It follows therefore that the word Deva as opposed to Asura must

1 R. V. I., 164; A. V. IX, 8.

mean an ordinary month or days. Accordingly, we may interpret the conflict between the Devas and the Asuras as denoting some inconsistency between the ordinary and the intercalary months. That the words, *Deva*, *Asura* and *Prajā* have such meanings as the above, is confirmed by the above passage: We are told in the passage that Prajāpati or Father Time repelled the Asuras by means of the Chātur-māsya, a period of four intercalary months, as pointed out above—and that having done so, he created children. This evidently means that Prajāpati got rid of the extra months by intercalating four months in ten years, and adjusting thereby the lunar to the sidereal year, brought the seasons and days to their usual position which was four months behind before intercalation. We also learn that Indra is a god of an intercalary month, and that the oft-repeated destruction of Vṛitra by Indra is an act of getting rid of the sinful and demon-like eclipse through the worship of Indra and other gods; for we are told in the passage that Indra killed Vṛitra by the Sākamedha, or the sacrifice performed during the third period of the four intercalary months, *i.e.*, at the end of 30 or 60 years.

From a consideration of the passage explained above, we learn that Prajāpati is Father Time, that his children are the ordinary days of the year, that the Asuras are the sinful intercalary months, and that Indra is a god of an intercalary month. We know from the story of Aditi that Indra is one of her sons. Accordingly, we may take Aditi to mean the cycle of five luni-solar years, bringing forth Indra periodically along with her other sons. The other sons also must necessarily be the gods of intercalary months. This idea is, as clearly as

the sacrificial terminology of the poets could permit, conveyed in the following passage of the *Maitrāyaṇīya Samhitā* (I. 6, 12):—

यस्या राज्याः प्रातरग्निमाधास्यमानः स्यात्तां रात्रीं चतुश्शराव-
रावमोदनं पक्त्वा ब्राह्मणेभ्यो जीवतण्डुलमिवोपहरेत्. अदितिर्वै
प्रजाकामौदनमपचत्. सोच्छिष्टमाश्नात्. तस्या धाता चार्यमा चाजा-
येतां. सापरमपचत्. सोच्छिष्टमाश्नात्. तस्या मित्रश्च वरुणश्चा-
जायेताम्. सापरमपचत्. सोच्छिष्टमाश्नात्. तस्या अंशश्च भगश्चा-
जायेताम्. सापरमपचत्. सैक्षतोच्छिष्टं मेऽश्नत्या द्वौ द्वौ जायेते.
इतो नूनं मे श्रेयः स्याद्यत्पुरस्तादश्नीयामिति सा पुरस्तादशित्वोपा-
हरत्. ता अन्तरेव गर्भः संता अवदताम् इदं भविष्यावो यदा-
दित्या इति. तस्याः आदित्या निर्हतारमेच्छन्. ता अंशश्च भगश्च
निरहताम्. तस्मादेतो यज्ञेन यजंते. अंशप्राप्तोऽशस्य भागधेयं जनं
भगोऽगच्छत्. तस्मादाहुर्जनो गंतव्यः तत्र भगेन संगच्छत इति. स
वा इन्द्र ऊर्ध्व एव प्राणमनूदश्रयत. मृतमितरमण्डमवापद्यत. स
वाव मार्ताण्डो यस्येमे मनुष्याः प्रजाः सा वा अदितिरादित्यानुपा-
धावत्. अस्त्वेव म इदं मोधे परापतदिति. तेऽब्रुवन् अथैवोऽस्माक-
मेव ब्रवातै न नोऽतिमन्यता इति स वाव विवस्वानादित्यो यस्य
मनुश्च वैवस्वतो यमश्च. मनुरेवास्मिन्कोके यमोऽमुष्मिन् एते वै
देवयानान्पथो गोपायंति यदादित्याः त इयक्षमाणं प्रतिनुदंते. यो
वा एतेभ्योऽप्रोच्याग्निमाधत्ते तमेते स्वर्गाल्लोकात्प्रतिनुदंता उच्छिष्ट-
भागा वा आदित्याः यदुच्छिष्टे विवर्तयित्वा समिध आदधाति
तदादित्येभ्योऽग्न्याधेयं प्राह नैनं स्वर्गाल्लोकात्प्रतिनुदंते. संवत्सर-
मुत्सृजेताग्निमाधास्यमानो नास्याग्निं गृहाद्वरेयुर्नान्यता आहरेयुः.
संवत्सरे वृद्धा गर्भाः प्रजायंते प्रजातमेनं वृद्धमाधत्ते. द्वादश रात्री-
रुत्सृजेत द्वादश वै रात्रयः संवत्सरस्य प्रतिमा. संवत्सरे वृद्धा
गर्भाः प्रजायंते प्रजातमेनं वृद्धमाधत्ते तिस्र उत्सृजेत. त्रयो वा इमे
लोकाः. इमानेव लोकानामोति. एकासृत्सृजेत एको वै प्रजापतिः.

M. S. 1, 6, 12.

“During that night on the morrow of which he is going to set up the sacred fire, he should cook four dishes of rice and present them to Brāhmans as fresh rice. Desirous of getting children, Aditi cooked the rice. She ate the remnant (*of what remained after the gods partook of the dish*). Two sons, Dhātā and Aryamā, were in consequence born of her. She cooked another (*dish*) and ate the remnant. Two sons, Mitra and Varuṇa, were in consequence born of her. She cooked another (*dish*), and ate the remnant. Two sons, Amśa and Bhaga, were in consequence born of her. She cooked another (*dish*). She thought that in consequence of her eating the remnant, two and two sons are being born of her; and that it would indeed be to her advantage if she would eat it before (*presenting it to the gods*). Accordingly, having previously eaten it, she offered the remnant (*to the gods*). The seeds, still remaining in the embryo form, said: ‘We shall become what the Ādityas are.’ The Ādityas on the other hand looked for a murderer of those two. Amśa and Bhaga struck them. Hence sacrificers worship these two in their sacrifices. Amśaprāsa became the portion due to Amśa in sacrifices. Bhaga went to the people. Hence they say that if one is desirous of getting wealth, one should go to somebody among men. That Indra, however, got up and recovered his breath. The other egg appeared as dead. He is, verily, the Mārtāṇḍa (*broken egg*) whose children are men. Aditi then went to the Adityas and said ‘Let this one be to me, but not the other which has fallen lifeless. They said: ‘Then let it be to ourselves as we say; do not despise us.’ He is, verily, the Aditya the Vivasvat, whose offspring are Manu, the Vaivasvat

and Yama, the Vaivasvata. Manu is in this world, and Yama in the other. These are the Adityas who guard the paths through which gods move. They drive away that sacrificer who sets up his sacred fire without calling upon them: they drive him away from the heavens. The Adityas are, verily the portions of the remnant. When a sacrificer puts the sacred sticks into the fire after rotating them in the remnant, then he may be taken to have spoken to the Adityas of his setting fire. Him they do not throw away from the heavens. He who is going to set up the sacred fire should *omit* a year (*i.e.*, intercalate a year). He should not bring his fire from a household or from any other place. Embryos [due to the remnant, *i.e.*, the twelve days at the end of the sidereal year of 366 days], developed in the course of the year are born. When the embryo is born and fully developed, the sacrificer sets it up (*while setting up the sacred fire*). Twelve nights he has to omit (*in a year*); for twelve nights are the index (*pratimā*) of the year. Embryos [*i.e.*, the twelve days] developed (*in the form of months*) in the course of (*the cyclic*) year are born. When it is born and fully developed, he sets it up [*i.e.*, intercalates while setting up the sacred fire]. He should omit three, for three are the worlds: these worlds he will thereby attain. He should omit one, for one is the Prajāpati."

From what has been said above, it is clear that the three good twin sons brought forth by Aditi in consequence of her eating the remnant must necessarily be the three pairs of intercalary months occurring in the course of three luni-solar cycles of five years each in consequence of the difference, or remnant as it is called,

of twelve days between a lunar and a sidereal year. There is a sufficient clue in the passage itself to interpret the story of Aditi in this way. We are told in the passage that the sacrificer should omit or intercalate a year and that then he should set up the sacred fire anew. From the *Maitrāyaṇīya Samhitā* I. 10, 7, we also know that the rite of setting up or churning the fire anew was performed at the end of the third intercalary period of four months at the close of thirty years. We are told in the above passage that the sacrificer had to omit twelve days every year and that the embryos developed in the course of the (*intercalated*) year were born. In the parlance of the Vedic poets, embryos or children are, as already pointed out, days of the year, either ordinary or intercalary. If, then, the twelve days at the end of the sidereal year are, as implied in the above passage, the embryo, which, when developed and born, the sacrificer is called to set up, it follows that the remnant which gave to Aditi a pair of sons is the same period of twelve days, giving rise to two intercalary months in the course of five luni-solar years. If this meaning is true, it follows that the three other pairs of Aditi's sons must also be three other pairs of intercalary months, occurring in the course of fifteen luni-solar years. If this is true, it is clear that what are called Dhātā, Aryamā, Mitra, Varuṇa, Aśvī and Bhaga, are the gods of the six intercalary months occurring in the course of fifteen luni-solar years. The only riddle that remains to be solved in the above passage is that connected with the birth of the fourth pair of sons, of whom one, called Indra, is said to have been fully born while the other, called Mārtāṇḍa, is said to have been half-born. If we paraphrase the Vedic

language in our modern language, and say that three pairs of intercalary months and a seventh one were full and the eighth intercalary month was a broken month, we know where to seek for an explanation of this break. We know that the only year which can keep the seasons, especially the commencement of the much-desired rainy season, in their usual position, is the solar year of $365\frac{1}{4}$ days, but not the sidereal year of 366 days, which is evidently too long by three-fourths of a day. This excess will amount to $\frac{3}{4} \times 20 = 15$ days in the course of four cycles of five years each or in twenty sidereal years. Accordingly if this greater cycle of twenty years, with eight or rather seven and a half intercalary months to be intercalated at the end of the twenty years, had begun to be observed, as months, as the Vedic poets seem to have done, then the beginning of the year would fall back, not by eight months, as the Vedic poets first supposed, but by seven and a half months; or in other words the Hindu lunar year which begins with Chaitra¹⁰ would then fall back and begin at the middle of Srāvaṇa of the rainy season, instead of at the end of Ashāḍha, as the poets seem to have expected it. How the poets found out the error, is a question with which we are not concerned here. Whatever may be the way in which they detected the break or error, the only explanation that can possibly be given for the half-birth of the eighth intercalary month or son, seems to be the one I have given above. This theory of intercalary months explains the simultaneous arrival of the 'seven streams' of the rainy season, of the

10 But it is only in the later calendar that we have a Chaitrādi year. In the Vedic period the year and the cycle began with Māgha.—J. F. F.

demon, Vṛitra, meaning eclipse, and of Indra, the god of the seventh intercalary month, for the destruction of the demon.

The Vedic poets seem to have entertained two kinds of conceptions about the intercalary months; one evil and another good. Indra, Mārtaṇḍa, and other sons of Aditi seem to have represented the good side of the months, while Vṛitra, Sambara, and other demons of eclipses are regarded as the personification of evil nature of the intercalary months. If there still remains any doubt about this point, the following passage of the *Maitrāyaṇya Saṁhitā* (II. 3, 4) will probably help to remove it:—

ततो यस्सोमोऽत्यरिच्यत तमग्ना उपप्रावर्तयत् । स्वाहेन्द्रशत्रु
वर्धस्व इतीन्द्रस्याहैनं शत्रुमचिकीर्षदिन्द्रमस्य शत्रुमकरोत् । तथा
वाक्स्वयमेव व्यैत्स यं सोमं प्रावर्तयद्यस्मिञ्चाग्ना उपप्रावर्तयत्ता
अग्नीषोमौ देवते प्राणापाना अभिसमभवताम् । स यावदूर्ध्वबाहुः परा
विध्यत्तावति व्यरमत । यदि वा प्रचणं तावदासीद्यदि वाग्नेरधि ताव
दासीत्स वा इषुमात्रमेवाह्वा तिर्यङ्ङ्वर्धतेषुमात्रमेवान्वङ्ङ्वाथो आहु
रहोरात्रे एवेषुमात्रं तिर्यङ्ङ्वर्धतेषुमात्रमन्वङ्ङित्यथो आहुरर्धमास
मथोमास मथो संवत्सरमिति । स वा इमाः सर्वाः स्तोत्राः पर्यशय
त्तस्माद्वा इन्द्रोऽविभेत्तस्मादु त्वष्टाविभेत्तस्येन्द्रः प्रत्तिमैच्छत्तमस
प्रायच्छत् । तस्मै त्वष्टा वज्रमसिचत्तपो वै स वज्र आसीत्तमुद्यन्त
नाशक्नोदथ वै तर्हि विष्णुरन्या देवतासीत्सोऽब्रवीद्विष्णा एहि इदमाह
रिष्यावो येनायमिदमिति स त्रेधात्मानं विन्यधत्ताभिपर्यावर्तादविभे
दस्यां तृतीयमन्तरिक्षे तृतीयं दिवि तृतीयं । स यदस्यां तृतीयमासी
त्तेन वज्रमुदयच्छद्विष्ण्वनुष्ठितः । स वज्रमुद्यतं दृष्ट्वाविभेत्सोऽब्रवीत्
स्ति वा इदं त्यस्मिन्नंतर्वीर्यं तत्ते प्रदास्यामि मा मा वधीरिति
तद्वा अस्मै प्रायच्छत् । तत्प्रत्यगृह्णात् । अथा मा इति तद्विष्णवे

ऽतिप्रायच्छत्. तद्विष्णुः प्रत्यगृह्णात् । अस्मास्विन्द्र इन्द्रियं दधा-
त्वस्मान्नायो मघवानः सचन्ताम् । अस्माकं संत्वाशिषः । इति
सोऽवेदस्ति वा त्यस्मिन्नन्तर्वीर्यमिति. स यदन्तरिक्षे तृतीयमासीत्तेन
वज्रमुदयच्छद्विष्ण्वनुष्ठितः. स वज्रमुद्यतं दृष्ट्वाविभेत्सोऽब्रवीदस्ति
वा इदं त्यस्मिन्नन्तर्वीर्यं तत्ते प्रदास्यामि मा मा वधीरिति. तद्वा
अस्मै प्रायच्छत् प्रत्यगृह्णात्. द्विर्माधाः इति तद्विष्णवेऽतिप्रायच्छत्
तद्विष्णुः प्रत्यगृह्णात्. अस्मास्विन्द्र इन्द्रियं दधात्वस्मान्नायो मघवानः
सचन्ताम् । अस्माकं संत्वाशिषः. इति. सोऽवेदस्ति वा वास्मिन्न-
न्तर्वीर्यमिति. स यद्विवि तृतीयामासीत्तेन वज्रमुदयच्छद्विष्ण्वनु-
ष्ठितः. स वज्रमुद्यतं दृष्ट्वाविभेत्सोऽब्रवीदस्ति वा इदं त्यस्मिन्नन्तर्वीर्यं
तत्ते प्रदास्यामि मा मा वधीरिति. संधां नू संदधावहै यथा त्वामेव
प्रविशानीति. सोऽब्रवीद्यन्मां प्रविशेः. किं मे ततः स्यादिति.
सोऽब्रवीत्त्वामेवेंधीय तव भोगाथ त्वां प्रविशेयमिति. तद्वा अस्मै
प्रायच्छत्. तत्प्रत्यगृह्णात्. त्रिर्माधाः इति तद्वाव त्रैधातव्या
सहस्रं वा अस्मै तत्प्रायच्छत्. ऋचः सामानि यजूंषि यद्वा इदं किंच
तत्रैधातव्या तदामोति पशूनेव.

उदरं वै वृत्रः पाप्मा क्षुद्भ्रातृव्यः पुरुषस्य. यत्तप उपैति पाप्मानं
वा एतत्सृणुते भ्रातृव्यं क्षुधमेव तस्मिन्वा अवदेतां सयमस्या
अध्यूर्वा वागवदत्. उभा जिग्यथुर्न पराजयेथे न पराजिग्ये
कतरश्च नैनोः ।

M. S. II, 4, 4.

“ Then what Söma there remained, he poured it into
the fire, and said rather in favour of Indra than Agni :
' Grow with Indra as thy enemy.' He wanted Agni to be
Indra's enemy : but he made Indra the enemy of Agni :
for his expression itself came out (*with that meaning*).
Both the Soma he pressed and the Soma he put into the
fire became the two deities Agni and Soma, and also the

two vital airs, Prāṇa and Apāna (*air inhaled and air exhaled*). No sooner did this dual god with his arm raised up attempt to strike Indra, than he himself fell down. Whether when the dual deity fell down, or when he was inside the fire (*it cannot be said*),—he, however, began to grow breadthwise by the measure of an arrow in the course of a day, and also lengthwise by the measure of an arrow in the course of day. They say that day and night themselves grew breadthwise by the measure of an arrow and also lengthwise by the measure of an arrow. They say that then the half-months (*grew*); then the month; and then the year. Then this dual deity lay covering all these streams. Indra became afraid of him; Tvashṭri also feared him, Indra requested the help of Tvashṭri. The latter promised help: he sprinkled the thunderbolt (*with water*) for him. Tapas [the month so called] is, verily, the thunderbolt. Indra could not raise it. Then there was another god, Viṣṇu, near. Indra said: 'Come, Viṣṇu, let us catch hold of this by which this (*is done*).' Viṣṇu stretched his body in three directions, one-third portion on the earth, one-third in the air, and one-third in the heaven, so that Indra might get rid of his fear from the universal growth of the dual deity. Followed by Viṣṇu, Indra raised the thunderbolt against the one-third part of the dual deity lying on this earth. Seeing the thunderbolt raised, he became afraid of it, and said: 'There is in me some power and I shall give it to you. Do not kill me!' He gave it to Indra, and the latter took it and thought: 'May Indra put vital force into us; may Indra bring prosperity to us; may there be blessings upon us; for there is internal power in him. Followed by Viṣṇu, Indra raised the thunderbolt against

the one-third part that lay in the air. Seeing the raised thunderbolt, he became afraid of it, and said : ' There is some power in me and I shall give it to you. Do not kill me ! ' He gave it to Indra, and Indra took it and gave it to Vishṇu, saying ' keep this for me a second time.' Vishṇu took it, thinking : ' May Indra put vital force into us ; may Indra bring prosperity to us ; may there be blessings upon us ; for there is internal power in him.' Followed by Vishṇu, Indra raised the thunderbolt against the one-third part that lay in the sky. Seeing the raised thunderbolt, he became afraid of it, and said : ' There is some power in me and I shall give it to you. Do you kill me ? let us make peace : I shall enter into you.' Indra said : ' If you enter into me, of what use will it be to me ? ' He said : ' I shall brighten yourself ; I shall enter into you for your own enjoyment.' (*So saying*) he gave it to Indra, and Indra took it and gave it to Vishṇu, saying : ' Keep this for me for a third time.' It (the power) is, verily, a thousand of what are called Tridhātus (three colours). He gave it to Vishṇu. The Ṛiks, the Sāmas, the Yajus, and whatever else there is, all that belongs to the three elements. Hence he obtains cattle alone."

" Vṛitra is the belly ; and sin is hunger, the enemy of man. When man obtains Tapas, he rends the sin, the inimical hunger. This is what the heavenly utterance said : ' Both of them conquered, but never sustained defeat ; and no one defeated either of them (*Indra and Vishṇu.*) "

We are told in the above passage that Vṛitra grew out of the remnant of Soma and that he grew first in the

form of a day, then of half a month, then of a month, and at last of a year. Thus Vṛitra is clearly identified with time. Special attention should be paid to those sentences of the passage which clearly declare: 'Vṛitra began to grow breadthwise by the measure of an arrow in the course of a day and also lengthwise by the measure of an arrow in the course of a day. They say that *day and night themselves grew* by the measure of an arrow, and became half months, months, and a year.' It is clear therefore that Vṛitra is a demon infesting the intercalary months or rather of the eighth intercalary month, since Indra who destroys him periodically is, as we have seen above, the god of the seventh intercalary month of the luni-solar cycle of five years. Since Vṛitra is made to 'enter into Indra himself,' it is clear that he is the broken eighth month coming after the seventh month.

I have pointed out in the *Vedic Calendar* how the Vedic poets regarded the intercalary days as being sinful and inimical to man. In the above passage Vṛitra is spoken of as a kind of sin and enemy to man. We have already seen how Agni and Soma are considered as the gods of the light half of an intercalary month. In the following passage of the Taittiriya Saṁhitā (II. 5, 2) Agni and Soma are clearly described as the life-principles of Vṛitra. It follows therefore that Vṛitra must be the light half of an intercalary month. Since Vṛitra is periodically destroyed by Indra, the god of the seventh intercalary month, and since he is made one with Indra himself, it is also clear that Vṛitra is the first half of the broken eighth intercalary month. The reference to cold and fever in the passage seems to indicate the rainy season. The passage itself runs as follows:—

त्वष्टा हतपुत्रो वींद्रं सोममाहरत्. तस्मिन्निंद्र उपहवमैच्छत्. तं नौपाह्वयत पुत्रं मेऽवधीरिति. स यज्ञवेशसं कृत्वा प्रासहा सोममपिवत्. तस्य यदत्यशिष्यत तत् त्वष्टाहवनीयमुपप्रार्थयत् स्वाहेन्द्र-शत्रुर्वर्धस्वेति. यदवर्तयत् तद्वृत्रस्य वृत्रत्वं. यदब्रवीत् स्वाहेन्द्रशत्रुर्वर्धस्वेति तस्मादस्य इन्द्रः शत्रुरभवत्. स संभवन्नग्नीषोमावभिसमभवत्. स इषुमात्रमिषुमात्रं विष्वङ्कृत्ववर्धत. स इमाल्लोकानावृणोत्. तद्वृत्रस्य वृत्रत्वं. तस्मादिन्द्रोऽविमेत्. स प्रजापतिमुपधावत् शत्रुर्मेऽजनीति. तस्मै वज्रं सिक्त्वा प्रायच्छदेतेन जहीति. तेनाभ्यायत तावब्रूतामग्नीषोमौ मा प्रहारावसंतः स्व इति. मम वै युवं स्थ इत्यब्रवीत् मामभ्येतमिति. तौ भागधेयमैच्छेताम्. ताभ्यामेतमग्नीषोमीयमेकादशकपालं पूर्णमासे प्रायच्छत्. तावब्रूतामभिसंदष्टौ वै स्वो न शक्नुव एतुमिति. स इन्द्र आत्मनः शीतरूरावजनयत्. तच्छीतरूर्वोर्जन्म. य एवं शीतरूर्वोर्जन्म वेद नैनं शीतरूरौ हतः. ताभ्यामेतमभ्यनयत्. तस्माज्जज्ञभ्यमानादग्नीषोमौ निरक्रामताम्. प्राणापानौ वा एनं तदजहिताम्. प्राणो वै दक्षोऽपानः क्रतुः. तस्माज्जज्ञभ्यमानो ब्रूयान्मयि दक्षक्रतू इति.. प्राणापानावेवात्मन्धत्ते. सर्वमायुरोति. स देवता वृत्रान्निर्हूय वार्त्रघ्नं हविः पूर्णमासे निरवपेत्. घ्नन्ति वा एनं पूर्णमासा आ अमावास्यायामाप्याययन्ति तस्माद्वार्त्रघ्नी पूर्णमासेऽनूच्येते वृधन्वती अमावास्यायाम्. तत् संस्थाप्य वार्त्रघ्नं हविर्वज्रमादाय पुनरभ्यायत तेऽब्रूतां द्यावापृथिवी माप्रहारावयोर्वै श्रित इति. तेऽब्रूतां वरं वृणावहै नक्षत्रविहिताहमसानीत्यसावब्रवीच्चित्रविहिताहमिति. इयं तस्मान्नक्षत्रविहितासौ चित्रविहितेयं य एवं द्यावापृथिव्योवरं वेदैर्न वरो गच्छति. स आभ्यामेव प्रसूत इन्द्रो वृत्रमहन्. ते देवा वृत्रं हत्वाग्नीषोमावब्रुवन् हव्यं नो वहतमिति. तावब्रूतामपतेजसौ वै त्यौ वृत्रे वै त्ययोस्तेज इति. तेऽब्रुवन् क इदमाच्छेतीति. गौरित्यब्रुवन् गौर्वाव सर्वस्य मित्रमिति. साब्रवीत् वरं वृणै मय्येव सतोभयेन भुनजाध्वा इति तद्गौराहरत्. तस्माद्गवि सतोभयेन भुञ्जते

एतद्वा अग्नेस्तेजो यद्वतेमतत् सोमस्य यत्पयः च एवमग्नीषोमयो
स्तेजो वेद तेजस्येव भवति. ब्रह्मवादिनो वदन्ति किन्दैवत्
पौर्णमासामिति. प्राजापत्यमिति ब्रूयात्. तेनेन्द्रं ज्येष्ठं पुत्रं निर-
वास्यदिति. तस्माज्ज्येष्ठ पुत्रं घनेन निरवसाययन्ति. T.S. II. 5.2

"Tvashṭri whose son was killed (*by Indra*) began to perform a Soma sacrifice without inviting Indra to it. But Indra wanted to be invited to it. But he did not invite Indra, because the latter killed his son. But Indra drank the Soma by force after obstructing the sacrifice. Tvashṭri poured (*prāvarṭayat*) into the fire what Soma here remained, and said (*addressing the fire*): 'Grow with Indra as thy enemy.' Vṛitra [the demon that rose from the fire in consequence of the above libation] is so called, because the act of pouring down Soma into the fire is from the root *Vṛit*. Since he said: 'Grow with Indra as thy enemy,' Indra became his enemy. While coming out of the fire, he (Vṛitra) became Agni and Soma. By the measure of an arrow, he grew on all sides and pervaded these three worlds. Because he pervaded them, he is called Vṛitra, 'pervader.' Indra became afraid of him, and going to Prajāpati, said: 'there has arisen an enemy to me.' Having sprinkled the thunderbolt with water, he gave it to him to kill the demon. Indra advanced with the thunderbolt. Then Agni and Soma said: 'Do not kill; we are within (*him*). Indra said: 'You are for me; and so, come to me.' They asked for a share (*in the sacrifice*). Indra promised to them a cake on eleven pot-sherds, to be offered to them every full moon. They said: 'We are bitten (*by his teeth*), and cannot come out (*of his mouth*.) Then Indra created cold out of his own body cold and fever. This is how cold

and fever came into existence. Whoever knows this origin of cold and fever, will not be attacked by cold and fever. Indra transferred cold and fever to them (*or to Vṛitra*). When he (*Vṛitra*) began to shiver, Agni and Soma came out: it is *prāṇa* (air inhaled) and *apāna* (air exhaled) that left him. *Prāṇa* is *Daksha* and *Apāna* is *Kratu*. Hence the sacrificer should begin to shiver and say: 'Daksha and Kratu are within me.' Thereby he will have *Prāṇa* and *Apāna* in himself, and live the whole length of life. Having released the gods from *Vṛitra*, Indra offered an oblation at the full-moon on account of his slaying *Vṛitra*; for they kill him at full-moon, and revive him at new-moon. Hence a *Ṛik*-verse about the slaying of *Vṛitra* is recited at full-moon, while another about his revival is sung on the occasion of new-moon. Having offered an oblation for slaying *Vṛitra*, Indra again faced *Vṛitra* with his thunderbolt. Then the Sky and the Earth said: 'Do not kill him, for he is lying upon us.' And they said again: 'We request a gift (*if he is to be killed*); I shall like to be decked with stars—so said the Sky; and I shall like to be variously formed,—so said the Earth.' Hence the Sky is decked with stars, while the Earth is variously formed. Whoever knows this gift of the Sky and the Earth will have the same gift. Having been born out of these two (the Sky and the Earth), Indra killed *Vṛitra*. Having killed *Vṛitra*, the gods asked Agni and Soma to carry their oblations. They said: 'We have lost our energy; for it is in *Vṛitra*. The gods inquired among themselves, saying 'who can secure that energy?' Some replied: 'The cow (*can do that*); for the cow is the friend of all.' The cow said: 'I shall request a gift: you live upon the two

things that exist only in me.' The cow secured that energy. Hence they live upon the two things that exist in the cow alone. What is called *ghī* is the energy of Agni, and what is called milk is that of Soma. Whoever knows thus the energy of Agni and Soma will be energetic. The Brahmvādins debate: 'Of what deity is the full-moon?' One should reply: 'Prajāpati.' Hence Prajāpati gave to Indra, his eldest son, a firm footing. Hence men give to their eldest son a firm footing by bestowing upon him a large portion of wealth."

The following passage of the Taittiriya Saṁhitā (VI, 5, 1) seems to furnish additional evidence about Vritra being a half month:—

इन्द्रो वृत्राय वज्रमुदयच्छत्- स वृत्रो वज्रादुद्यतादविमेव
सोऽब्रवीन्मा मे प्रहारास्ति वा इदं मयि वीर्यं तत्ते प्रदास्यामीति
तस्मा उक्थ्यं प्रायच्छत्. तस्मै द्वितीयमुदयच्छत्. सोऽब्रवीन्मा
मे प्रहारास्ति वा इदं मयि वीर्यं तत्ते प्रदास्यामीति तस्मा उक्
थ्यमेव प्रायच्छत्. तस्मै तृतीयमुदयच्छत्. तं विष्णुरन्वतिष्ठ
जहीति. सोऽब्रवीन्मा मे प्रहारास्ति वा इदं मयि वीर्यं तत्ते प्र
दास्यामीति. तस्मा उक्थ्यमेव प्रायच्छत् तं निर्मायं भूतमहन् य
हि तस्य मायाऽऽसीत्.

"Indra raised the thunderbolt against Vritra. The Vritra became afraid of this raised thunderbolt; he said 'Do not kill me; there is some power in me; that I shall give you.' So saying he gave Ukthya (Fifteen) to Indra. Indra raised weapon against him for a second time. He said: 'Do not kill me; there is some power in me; that I shall give you.' So saying he gave the latter the same Ukthya (Fifteen.) Then Indra raised the weapon against him for a third time; then Vritra

followed Indra, saying 'kill him.' He said: 'Do not kill me; there is some power in me; I shall give you that.' So saying he gave the same Ukthya to Indra. Indra then killed this guileless demon. It was, verily, the sacrifice which was his guile."

We are told in the above passage that while breathing out, Vṛitra gave *Ukthya* to Indra. *Ukthya* is a word used in the Vedic literature in the sense of 'fifteen.'¹² The word *Vajra*, the weapon of Indra, is also used in the same sense.¹³ Accordingly the wielding of *Vajra* or 'fifteen' by Indra as well as the gift of fifteen by Vṛitra to Indra clearly mean the growth of fifteen days over and above the seventh intercalary month.

Contemporary religious records also furnish evidence that the Ādityas are the Gods of intercalary months. It is known that the Adityas are the sons of Aditi. Aditi in the R̥gveda (X.100. 1, 94) is requested to protect the poets from *Amhas*, 'sin.' She and her sons also are requested to release the poets from guilt or sin (R. V. I. 24; II. 27; VII. 93; I. 162; VII. 87).¹⁴ I have shown in the first chapter how the word *Amhaspatya* is used in the sense of an intercalary month and an intercalary month alone. There is no doubt that this word is philologically identical with the Zend word *Ameshaspenta*. The number of Ameshaspentas is also seven. Prof. Macdonell says (*Vedic Mythology*, P. 44). "It is here to be noted that the two groups have not a single name in common, even Mithra not being an Ameshaspenta; that

12 See *Tai, Sam.* VII. 2, 5, 17.

13 See *Ibid.* VII. 3, 6, 15; 4, 7, 25.

14 See Macdonell's *Vedic Mythology*, p. 121.

the belief in the Adityas being seven in number is not distinctly characteristic and old; and that though the identity of Adityas and Ameshaspentas has been generally accepted since Roth's essay, it is rejected by some distinguished Avestan scholars."

Whatever might be the reason of the Avestan scholars for rejecting the identity, this much is clear, that the words Amhaspatya and Ameshaspenta are identical; and that when the former word is invariably used in the sense of an intercalary month in the Yajurveda, there is no doubt that the forgotten meaning of the latter word must also be the same and that when the Ameshaspentas are seven, the number of Amhaspatyas must also be and is, as we have already seen, seven. As regards the difference in the names of the Ameshaspentas and of the Adityas, it does not appear to be of much importance, for the seven Amhaspatyas or intercalary months are found variously named both in the R̥gveda and the Atharvaveda.

The following are some of the passages of the Atharvaveda (VIII. 9) in which the seven Adityas or the Gods of intercalary months are called in various ways

षडाहुश्शीतान्षड् मास उष्णानृतुं नो ब्रूत यतमोऽतिरिक्तः ।

सप्त सुपर्णाः कवयो निषेदुः सप्त छंदांस्यनु सप्त दीक्षाः ॥ 17

सप्त होमाः समिधो ह सप्त मधूनि सप्त ऋतवो ह सप्त ।

सप्ताज्यानि परिभूतमायताः सप्त गृध्रा इति शुश्रुमा वयम् ॥ 18

अष्ट जाता भूता प्रथमज ऋतस्याष्टैर्द्र ऋत्विजो दैव्या ये ।

अष्ट्योनिरदितिरष्टपुत्राष्टमीं रात्रिमभि हव्यमेति ॥ 21

अष्टैर्द्रस्य षड्यमस्य ऋषीणां सप्त सप्तधा ।

अपो मनुष्यानोपधीस्तां उ पंचानु सेचिरे ॥ 23

"Six they call the cold, and six the hot months.

Tell ye us the season, which one is in excess; seven eagles, poets, sat down; seven metres after seven consecrations." 17

Seven are the offerings, the fuels seven, the seasons seven; seven sacrificial butters went about the existing thing; they are such as have seven heavenly birds, so have we heard." 18.

"Eight are born the beings first-born of Rīta; eight, O Indra! are the priests who are of the gods; Aditi has eight wombs, eight sons; the oblation goes unto the eighth night." 21.

"Among the seers, eight are with Indra, and six are in pairs; they are seven-fold and seven; waters, men, and herbs,—over these the five (*years*) have showered." 23.

In verse 17 the poet clearly mentions the intercalary months (*Atirikta Ritu*) and numbers them in various names as seven. The expression 'seven seasons,' when taken with the expression 'the excessive season,' leaves no doubt that they are intercalary months and seven in number. In verses 21 and 23 the poet refers to the story of Aditi, and seems to hesitate to count her sons as eight, though that was the number fixed at first. In the following passages of the Atharvaveda (IX, 9. and R. V. I. 164) the seven months are called seven horses and seven sisters:—

सप्त युजंति रथमेकचक्रमेको अश्वो वहति सप्तनामा ।

त्रिनामि चक्रमजरमनर्वं यत्रेमा विश्वा भुवनानि तस्थुः ॥ 2

इमं रथमधि ये सप्त तस्थुः सप्तचक्रं सप्त वहंत्यश्वाः ।

सप्त स्वसारो अमि संनवंत यत्र गवां निहिता सप्त नामा ॥ 3

द्वादशारं न हि तज्जराय वर्वर्ति चक्रं परिद्यामृतस्य ।
 आ पुत्रा अग्ने मिथुनासो अत्र सप्त शतानि विंशतिश्च तस्थुः ॥ 13
 सनेमि चक्रमजरं वि वावृत उत्तानायां दश युक्ता वहन्ति ।
 सूर्यस्य चक्षू रजसैत्यावृतं यस्मिन्नातस्थुर्भुवनानि विश्वा ॥ 14
 साकंजानां सप्तथमादुरेकजं षड्विधमा ऋषयो देवजा इति ।
 तेषामिष्टानि विहितानि धामशः स्थात्रे रेजन्ते विकृतानि रूपशः ॥ 16

"Seven harness an one-wheeled chariot; one horse, having seven names, draws it. Of three naves is the wheel, unassailed, whereon stand all those existences. 2

"The seven that stand on this chariot, seven horses draw it, seven-wheeled; seven sisters shout at it together: where are set down the seven names of the kine?"

"The twelve-spoked wheel,—for that is not to be worn out,—revolves greatly about the sky of Rīta; there O Agni!, stood the sons, paired, seven hundred and twenty." 13.

"The unwasting wheel, with rim, rolls about; ten paired ones draw upon the upper side (*uttāna*); the sun's eye goes surrounded with the welkin in which stood all existences." 14.

"Of those born together the seventh they call the sole-born (single-born); six, they say, are twins, god-born seers; the sacrifices of them, distributed according to their respective stations and modified in form, more to the one permanent (*sthatre*)." 16.

The seven hundred and twenty sons, spoken of in verse 13, are evidently the 720 days and nights of the civil year; and the ten twins on the upper side of the chariot, referred to in the next verse, must necessarily be the 10 days and nights above the 360 days of the year.

This shows that the poets were well acquainted with the real length of the solar year. It is the seven Ādityas or the gods of the intercalary months, that are referred to in verse 16. The expression that the seventh was single-born clearly shows the break in the eighth intercalary month, as will be pointed out.

In the following verses of the Atharvaveda (X. 8.) the mention of the number 'one thousand' in connection with seven swans seems to furnish additional evidence that the seven Ādityas, eagles, or swans, as they are variously called, are the seven intercalary months.

द्वादश प्रधयश्चक्रमेकं त्रीणि नभ्यानि क उ तच्चिकेत ।

तत्राहतास्त्रीणि शतानि शंकवष्पष्टिश्च स्त्रीला अविचाचला ये ॥ 4

इदं सवितर्विजानीहि षड्यमा एक एकजः ।

तस्मिन्हापित्वामच्छंते य एषामेक एकजः ॥ 5

एकचक्रं वर्तते एकनेमि सहस्राक्षरं प्रपुरो निपश्च ॥

अर्धेन विश्वं भुवनं जजान यदस्थार्धं क तद्वभूव ॥ 7

सहस्राहत्या वियतावस्य पक्षौ हरेर्हसस्य पततस्स्वर्गम् ।

स देवान्सर्वानुरस्युपदद्य संपश्यन्याति भुवनानि विश्वा ॥ 18

"Twelve fellies, one wheel, three naves,—who understands that? Therein are inserted three hundred and sixty pins, pegs that are immovable."¹⁵ 4.

"This, O Savitri!, do thou distinguish; six are twins, one is sole-born; they seek participation in him who of them is the sole sole-born." 5.

"One-wheeled it rolls, one-rimmed, thousand-syllabled forth in front, down behind; with a half it has generated all existence; what its other half is,—what has become of that?" 7

"By a thousand days are the wings expanded of him, of the yellow swan flying to heaven: he, putting all the gods in his breast, goes, viewing together all existence."¹⁶ 18

In verse 4, the Sāvana year of 360 days is described and in verse 5, the three pairs of intercalary months together with the single seventh month are referred to. In verse 7, the cycle of 20 years is described as containing a thousand syllables, *i.e.*, days. The question about the other half seems to refer to the loss of fifteen days in the eighth intercalary month. In verse 18, the last cycle of five years with $7\frac{1}{2}$ intercalary months seems to be described as a special period or great year, each wing or half of which is measured by a thousand days. The yellow Swan is the seventh intercalary month. Now, if we expand the wings by putting 1,000 on each, its duration becomes equal to 2,000 days. In 2,000 days there

$$\text{are } \frac{2,000}{29\text{d, } 12\text{h, } 45\text{m,}} = \frac{2,000 \times 32}{945} = \frac{12,800}{189} = 67 \text{ lunations}$$

and 22 days, taking a lunation to be equal to 29 days, 12 hours, and 45 minutes.¹⁷ It is clear, therefore, that by the expressions 'thousand-syllabled chariot,' and 'a wing of thousand days' duration,' the poet refers to the last cycle in the greater cycle of 20 years, in-as-much as that cycle is approximately equal to five lunar years and seven and a half lunations. It is also to be noted that five lunar years are $= 5 \times 354 = 1,770$ days and twenty-times 12 extra days $= 20 \times 12 = 240$ days. Putting

16 Comp. A.V. XIII. 2,38.

17 But the Vedic estimate of the synodic lunar month, shown by the Jyotisha Vedāṅga, was 1830 days divided by 6 lunations = 29 days, 12 hours, 23,2258.....Second.

these together, we have $1,770 + 240 = 2,010$ days, which is greater by 10 days than the duration of 2,000 days, as described in verse 18. We shall see that the same cycle of five years with seven and a half intercalary months is also termed Purusha, 'man' or Sapta-purusha, 'seven men.' Hence it is probable that the rising up of the thousand-headed, thousand-eyed, and thousand-legged Purusha by 10 *angulās* or days above the earth, described in the Purushasūkta, refers to the same cycle of 2,010 days, which was made equal to 2,000 days. It is probable that the use of *angulas* to mark days was a common practice among the Vedic poets, as among the Arabians. Regarding the use of fingers by an Arabian prophet to mark days, this is what Alberūnī says¹⁸ :—

“—‘ We are illiterate people, we do not write, nor do we reckon the month thus and thus and thus,’ each time showing his ten fingers, meaning a complete month or thirty days. Then he (the prophet) repeated his words by saying ‘ And thus and thus and thus,’ and at the third time he held back one thumb, meaning an incomplete month of twenty-nine days.”

In the following verses of the Atharvaveda (XII, 3, 16; and XIII, 2, 24) the same intercalary months are described as seven sacrifices and seven yellow steeds :—

सप्तमेधान्पशवः पर्यगृह्णन् य एषां ज्योतिष्मानुत यश्चकर्ष ।

त्रयस्त्रिंशद्देवतास्तान्संचंते स नः स्वर्गमस्मिन्ने लोकम् ॥

सप्त त्वा हरितो वहन्ति देव सूर्य शोचिष्केशं विचक्षणम् ।

अयुक्त सप्त शुंध्यवः सूरौ रथस्य नष्टयः तामिर्याति स्वयुक्तिभिः ॥

“ Seven sacrifices the cattle obtained; of which some were full of light, and others were pining; to them the

18 *Chronology of Ancient Nations*, P. 78; 1879.

three and thirty attach themselves ; do thou conduct me unto the heavenly world."

"Seven yellow steeds, O heavenly sun, draw in the chariot thee, the flame-haired, the out-looking: the sun hath yoked the seven neat daughters to the chariot ; with them who are self-yoked, he goeth."

The only point to be considered in this is the number 33. Here, again, the allusion seems to be the same thousand days by which each wing of the heavenly swan was said to be expanded ; for 1,000 is equal to $\frac{1,000}{30} = 33$ months and 10 days or half of 67 lunations and 20 days.

In the following verse of the Atharvaveda (X, 8, 1 and 13; and XII. 4,22) the poets speak of the same cycle as one of eight wheels or eight intercalary months

अष्टाचक्रं वर्तते एकनेमी सहस्राक्षरं प्रपुरो निपश्चा ।

अर्धेन विश्वं भुवनं जजान यदस्यार्धं कतमः स केतुः ॥

"The eight-wheeled (*choriot*) rolls, having one thousand-syllabled, forth in front, down behind ; with a half it has generated all existence ; what its other half is,—which sign is that ? "

In the following passage of the Atharvaveda (IX 10, 17) the poet counts the intercalary months neither as eight nor as seven, but exactly as seven and a half and calls them embryos :—

सप्तार्धगर्भभुवनस्य रेतः विष्णोस्तिष्ठन्ति प्रदिशा विधर्मणि ।

ते धीतिर्मिर्मनसा ते विपश्चितः परिभुवः परिभवन्ति विश्वतः ।

"Seven and half, embryos, the seed of existence stand in front in Vishnu's distribution ; they, by thought by mind, they, inspired, surround on all sides the surrounders."

In the following verses of the Atharvaveda (X, 3, 8-10), the poet mentions the thirteenth month, and refers to the seven intercalary months as seven eagles and seven suns, making Kaśyapa the head of them:—

अहोरात्रैर्विमितं त्रिंशदंगं त्रयोदशं मासं यो निर्मिमीते ।

तस्य देवस्य क्रुद्धस्य एतदागः.....॥

कृष्णं नियानं हरयस्सुपर्णा अपो वसाना दिवमुत्पतन्ति ।

त आववृत्रन्सदनादृतस्य तस्य देवस्य क्रुद्धस्य एतदागः ॥

यत्ते चंद्र कश्यप रोचनावद्यत्संहितं पुष्कलं चित्रभानु ।

यस्मिन्सूर्या अर्पितास्सप्त साकं तस्य देवस्य क्रुद्धस्य एतदागः ॥

“He who measures out the thirteenth month, fabricated of days and nights, having thirty members,—against that god, angered, is this offence.

The yellow eagles, clothing the recurring Krishna¹, eclipse in waters, fly up to the sky; they have come hither from the seat of Rita; against that god, angered, is this offence.

“What of thee, O Kaśyapa, is bright, full of shining what that is combined, splendid, of wondrous light, in which seven suns are set together; against that god, angered, is this offence.”

In the following verses of the Atharvaveda (XIX. 53, 1 and 2) the Poet describes the same seven intercalary months as time in the form of a thousand-eyed horse with seven reins, and also as seven wheels:—

कालो अश्वो वहति सप्तरश्मिः सहस्राक्षः अजरो भूरिरेताः ।

तमारोहन्ति कवयो विपश्चितः तस्य चक्रा भुवनानि विश्वा ।

सप्त चक्रा वहति काल एव सप्तास्य नाभीरमृतं न्वक्षः ।

स इमा विश्वा भुवनान्यर्वाङ्गालः स हीयते प्रथमो नु देवः ।

1 “Iyānah Krishṇah daśabhih śahasraih” Tai. Ar. I, 6.

"Time drives a horse with seven reins, thousand-eyed, possessing much seed; him the inspired poet mount; his wheels are all beings.

"Seven wheels doth this Time drive; seven are his naves; immortality forsooth his axle; he, Time, including all these beings, goes on as first god."

The meaning of a thousand eyes is the same as that of a thousand syllables, or a thousand days expanding: wing of the heavenly swan, explained above.

Regarding Aditi's eight sons who became seven Adityas, the Tait. Ar. (I. 13) says as follows:—

अदितिर्जातमदितिर्जानित्वम् । अष्टौ पुत्रासो अदितेर्ये जातस्तन्वः परि । देवानुपप्रैत्सप्तभिः परा मार्ताण्डमास्यत् ॥ सप्तभिः पुत्रैरदितिः उपप्रैत्यूर्व्यं युगम् । प्रजायै मृत्यवे तत्परा मार्ताण्डमाभरदिति ॥

ताननुक्रमिष्यामः—मित्रश्च वरुणश्च धाता चार्यमा च अंशश्च भगश्च इन्द्रश्च विवस्वांश्चेत्येते

गर्भः प्राजापत्यः । अथ पुरुषस्सप्तपुरुषः ।

"Aditi is past and Aditi is future; of the eight sons of Aditi, who were born from her body, she approached the gods with seven sons and cast out Mārtāṇḍa; with seven sons Aditi approached the gods in the former Yuga (cycle of 20 years); she brought thither Mārtāṇḍa again for birth and death. We enumerate them: Mitra and Varuṇa, Dhātā and Aryamān, Amśa and Bhaga and Indra and Vivāsvān,—these are they."

"The seed belongs to Prajāpati, Father Time; and the Purusha (born thereof) is sevenfold,"

The *Śatapatha Brāhmaṇa* identifies the seven logs and tongues of Agni with purushā and also with Indra. The passages in which this identification is made are thus translated by Prof. Eggeling:—

“He offers with Vag. S. XVII. 79, ‘thine, O Agni, are seven logs,’—logs mean vital airs, for the vital airs do kindle him;—‘seven tongues,’—this he says with regard to those seven persons which they made into one person;—‘Seven Rishis,’—for seven Rishis they indeed were;—‘seven beloved seats,’—this he says with regard to the metres ‘sevenfold the seven priests worship thee,’—for in sevenfold way the seven priests indeed worship him;—‘the seven homes,’—he thereby means the seven layers of the altar;..... ‘seven,’ he says, each time,—of seven layers the fire-altar consists, and of seven seasons the year, and Agni is the year.”²³

“This same vital air in the midst doubtless is Indra. He, by his power, kindled those other vital airs from the midst; and in as much as he kindled, he is the kindler (Indra): the kindler indeed,—him they call ‘Indra’ mystically (esoterically), for the gods love the mystic. They (the vital airs) being kindled, seven separate persons (Purusha)²⁴.”

I presume that I have made it clear that the various expressions, such as the eight sons of Aditi, the seven or eight Adityas, seven eagles or swans, seven butters, seven logs of fire, seven tongues of Agni, seven Vāyus, seven cattle, seven breaths, seven Agnis, seven Purushas, seven horses, seven sisters, seven priests, seven seers and seven and a half embryos, are all of the same meaning,

23 Sat. Bra. IX. 2, 3, 44-45.

24 I bid VI. 1, 1, 2.

viz., the seven and a half intercalary months occurring in the cycle of twenty luni-sidereal years, and that the act of getting rid of the intercalary months is described as a recurring conflict between Vṛitra, the demon of the intercalary months and eclipses, and Indra, the god of the seventh intercalary month. That this conflict was a periodic and recurring phenomenon, is so well known to Vedic scholars that it needs no proof. The expression that Indra killed Vṛitra three times, securing thereby three *ukthyas* or 'fifteens,' evidently signifies the cycle of sixty years, which consists of three cycles of 20 years each or twelve cycles of 5 years each. Since Indra is said to be the slayer of Vṛitra, Śambara, Bala and other demons it is clear that those demons represent the same evil nature or side of the same intercalary months. The expression that Indra found out Śambara and killed him in the fortieth year (*R. V.* II. 12, 11) proves the same fact.



CHAPTER III

MANVANTARA CYCLE.

IN the first and second Chapters treating of the Vedic Sacrificial Calender and the Seven Adityas, it has been clearly pointed out how the units of '1000' and 'seven' are closely associated with each other. In the later Siddhānta works and also in the Amara Kośa, the same unit of '1000' is connected not with 'seven,' but with 'fourteen' which is double the number of 'seven'; but in doing so, the unit of 1000 is interpreted as a thousand Yugas and the unit of fourteen as fourteen Manvantaras of seventy-one or seventy-two Yugas each. Furthermore in making 1000 Yugas equal to fourteen times seventy-one or seventy-two Yugas, the word Yuga is given a wide meaning of 43,20,000 years and the whole is treated as an era of Brahmakalpa of 1000 fourfold Yugas split into fourteen Manvantaras of seventy-one or seventy-two fourfold divine Yugas each. Thus a simple arithmetical problem of 1000 days with one intercalary month, and 7000 days with seven intercalary months or 14,000 days with fourteen intercalary months became in the time of the Siddhāntas and the Amara Kośa a huge era of Brahmakalpa and Manvantaras made up of a huge number of years. It cannot at all be denied that this huge era of Brahmakalpa and Manvantaras has for its basis the same two simple units, the unit of 1000 and the unit of seven. This can be easily perceived if the era of Brahmakalpa and Manvantaras described in the Purāṇas and the Siddhānta works is analysed and traced to its

simple source. Let us then see what these works say of this era.

In the Sankalpa or declaration of good intention which every man belonging to the twice-born class makes before undertaking any religious rite, the era of Brahmakalpa coupled with the sixty years' cycle is stated as follows—

“On the auspicious day and hour, in the second Parārdha of First Brahma, which is called the Kalpa of the White Boar, in the period of Vaivasvata Manu, in the Kaliyuga, in the country of Jambūdvīpa, in Bhāratavarsha, in the county of Bharata, in the luni-solar cycle of the sixty years which begins with Prabhava and ends with Kshaya or Akshaya and which is current, as ordained by Lord Viṣṇu, in the year (name), of the cycle, in the Southern or the Northern Ayana, as the case may be, in the white or dark half, on the Tithi, 1 (name) begin to perform the rite (name) with the object of pleasing the Almighty.”

That this Sankalpa in terms of the era of Brahmakalpa is not a later compilation is evident from the references made to it in the Mahābhāṣya of Patañjali in the Purāṇas, Māhātmyas, and all astronomical works.

पुरा कल्पे एतदासीत्-षोडशमाषाः कार्षापणम्.

Regarding this era of Brahmakalpa, the Padma purāṇa says as follows—

In terms of his own measurement, he is said to have a hundred years. It is called a Para; and its half is

1 Patañjali, I. 1, 50; Viṣṇu Purāṇa, I. 1, 12; Setumātmya, XXII. 10; XXVI. 96; Brahmsiḍhānta, Introduction; Parāśaramāhaviya Vivāhaprakaraṇa.

called a Parārdha. Fifteen Nimeshas are said to make a Kāshṭha; Thirty Kāshṭhas make a Kalā; thirty Kalās make a Muhūrta; The same number (30) of Muhūrtas make a day and night for men; the number (30) of days and nights make a month; a month consists of two wings (fortnights); six of them (months) make an Ayana, and a year is made of two Ayanas; southern and northern. The southern Ayana is a night and the northern a day of the gods.

Of twelve thousand divine years (43,20,000) the four Yugas, Krita, Tretā, Dvāpara, and Kali are made; Know from me, O! King, their divisions; four, three, two, and one of a thousand divine years are there in the four Yugas in order, as settled by the ancients; an early Sandhyā or twilight period of the same number of hundreds is also affixed to them in order; a Sandhyāmsā or part of twilight period of the same length there is at the close of each Yuga. The above periods with Sandhyā and Sandhyāmsā constitute, O! King, a fourfold Yuga of Krita, Tretā, Dvāpara and Kali. One thousand of these makes a day-time to Brahma. O! King, there are fourteen Manus in a day of Brahma; listen to me about the measure of their (Manus') time; the seven sages, the gods, Indra, Manu and his sons are all created simultaneously and likewise they are put an end to. Seventy-one of the fourfold Yugas with a little more make a Manvantara, constituting the period of a Manu and the gods. To eight-hundred thousand of divine years, likewise fifty-two thousand, and thirty Koṭis they amount to. Likewise sixty-seven Niyutas, O! wise king, and twenty thousand;—no more than this.—This is the period of a Manu called Manvantara in

terms of human years. Fourteen such Manvantaras make a day time to Brahma; then the three worlds are burnt up; gods residing in the world called Mahah feel the heat and come up to the world called Janah. O King, learned in the knowledge of Brahma, hear me of that time when all the three worlds are submerged under water; the Lord swollen with the worlds in his belly sleeps on the snake-bed. He is meditated upon by the Yogis in the Jana-world. Then he creates a night of the same duration. Thus a year of Brahma is made up of 360 such days and nights. His life extends to a hundred of such years. In his period one Parārdha has elapsed; at the end of that Parārdha one Kalpa called Padma has ended; to the second Parārdha which is now current the name, 'Varāha,' is given.

The above scheme may be cast in a tabular form as follows :—

15 Nimeshas	A Kāshṭha
30 Kāshṭhas	A Kalā
30 Kalās	A Muhūrta
30 Muhūrtas	A day and night
30 Days and nights	A month of light and dark halves or wings
6 Months	An Ayana, Southern or Nor- thern called a night and day to Gods respectively
12,000 divine years or 43,20,000 human years	A fourfold Yuga
A Kṛita Yuga	4,800 Divine Years
A Tretā Yuga	3,600 Divine Years
A Dvāpara Yuga	2,400 Divine Years
A Kali Yuga	1,200 Divine Years

Thus the fourfold Yuga consists of 43,20,000 human years. 71 Fourfold Yugas or 30,67,20,000 years make a Manvantara. A day or night Kalpa of Brahma is equal to 14 Manvantaras, or 4,29,40,80,000 human years.

A day and a night Kalpa put together comes to 8,58,81,60,000 years. The Padmakalpa that has already passed is equal to the above number of years.

In the present Varāhkalpa a Day-Kalpa equal to 4,29,40,80,000 years and 6 Manvantaras equal to 1,84,03,20,000 years have also passed. The Vaivasvata Manu is now current.

The Amarakośa corroborates the above view. It says :

A month is a day and night to the Pitṛis.

A human year is a day and night to the Gods.

Two thousand divine Yugas make a day and night to Brahma.

They (the day and the night of Brahman) make two Kalpa periods to men.

Seventy-one divine Yugas make a Manvantara. According to the Sūrya Siddhānta a fourfold Mahāyuga is equal to 43,20,000 human years, made up of a Krita period of 17,28,000 years, a Tretā period of 12,96,000 years, a Dvāpara period of 864,000 years and a Kali period of 43,20,000 years. A Manvantara is equal to 71 Mahāyugas or 30,67,20,000 years. A day and night Kalpa of Brahma is equal to 8,63,00,00,000 years made of 28 Manu periods and 28 Manusandhi periods and one Krita period.

If the epithet 'divine' to Yuga is left out of consideration in the above calculations, the scheme may be recast in simple words as follows :—

71 Yuga years make a Manvantara.

14 Manvantaras or 1,000 Yuga years make a day or night Kalpa of Brahma.

If 1,000 is divided by 14, the quotient obtained is 71 and $6/14$. This fraction is referred to as "a little more" (sādhika) in the passage of the Padma Purāṇa quoted above. In the Amara Kośa and also in the Purāṇas this fraction seems to have been omitted and only the whole number 71 is taken as a fourteenth part of 1,000. In the astronomical works, however, a fourteenth part of 1,000 is put as 72 and a Manvantara is stated to be equal to 72 Yugas. All are, however, agreed in saying that a lunar month makes a day to the Pitris, that a human year of 360 days is a day and night to the Gods, and that two thousand Yuga years make a day and night to Brahma. According to Amara these two thousand Yuga-years make two Kalpas, a day Kalpa of 1,000 Yuga-years and a night Kalpa of 1,000 Yuga-years.

Now the question that crops up is what is the meaning of a Yuga. It is used in four different senses:

(i) A fourfold Yuga of 12,000 years made up of a Krita Yuga of 4,800 years, a Tretā Yuga of 3,600 years, a Dvāpara Yuga of 2,400 years and a Kali Yuga of 1,200 years;

(ii) A cycle of five human years, as expounded in the Vedāṅgajyautisha;

(iii) A single human year; and

(iv) A Parva or half a lunation, known as a white or dark half of a lunar month. In the Setumāhātmya which is said to form part of the Skānda Purāṇa, one of the

eighteen Purāṇas, the word 'Yuga' is used in the sense of a year of 360 or 366 days as follows:—

In olden times a saint called Gālava devoted to Vishṇu performed penance on the shore of the South Indian ocean, not far from Hālāśya, quite close to the village called Fullagrāma, near the tank Kshīrapushkariṇī, and also on the bank of the tank called Dharma-pushkariṇī for *ten-thousand Yugas* extolling the eternal Brahma; kind to all, observing fast, truthful, with full control over his senses, regarding all creatures as identical with himself, and with no desire for all worldly pleasures. For some years he lived on ripe leaves of trees and plants, for some years on water, and for some years on air. Thus he performed his penance for *five thousand years*. Then for the remaining *five thousand years* he continued his penance taking no food whatever, and without breathing in the air. In the rainy season he allowed himself to be drenched, in winter he kept standing in water, and in summer he sat in the midst of 'five fires', always being devoted to Vishṇu, meditating on the meaning of the 'Eight syllabled Mantra' and thinking of God Janārdana. Thus Gālava, the saint, performed his penance; thus there passed away ten thousand years when at last Vishṇu was pleased with him."

Here the equation of *ten thousand Yugas* with the sum of 'five thousand years' and the remaining 'five thousand years' clearly proves that Yuga is used in the sense of a year. Its use in the sense of a Parva of 15 Tithis is frequently met with in the Sūryapragnapti and other Jaina astronomical works. It says (P. 167) that in the Parvarāṣi number, that which is divisible by

four is called *krita*; that number which, when divided by four, leaves a remainder 3 is called *Tretā*; those numbers which, when divided by four, leave remainders 2 or 1 are called *Dvāpara* and *Kali* respectively. The verses run as follows—

चउर्हि हियम्मि पव्वे एक्के सेसम्मि होइ कलिओगो ।
 वेसु य दावरजुम्मो तिसु तेया चउसु कडजुम्मो ॥
 कलिओगो तेणवई पक्खेवो दावरम्मि वावट्ठी ।
 तेऊए एक्कतीसा कडजुम्मे णत्थि पक्खेवो ॥
 सेसद्धे तीसगुणे वावट्ठीभायियम्मि जं लद्धम् ।
 जाणे तइसु मुहुत्तेसु अहोरत्तस्स तं पव्व ॥

छाया

चतुर्भिहते पर्वणि एकस्मिन् शेषे भवति कल्योजः ।
 द्वयोः द्वापरयुगं त्रिषु त्रेता चतुर्षु कृतयुगम् ।
 कल्योजसि त्रिनवतिः प्रक्षेपो द्वापरे द्वाषष्टिः ।
 त्रेताया मेकत्रिंशत् कृतयुगमे नास्ति प्रक्षेपः ।
 शेषार्धे त्रिंशद्गुणे द्वाषष्ट्या भाजिते यल्लब्धम् ।
 जानीहि तेषु मुहूर्तेषु अहोरात्रस्य तत्पर्व ॥

When the Parva-number is divided by four, and when there is a remainder of one, it is *Kalyojah*; when the remainder is two, it is *Dvāparayugma*; when it is three, it is *Tretā*; and when it is four, that is, when there is no remainder, it is *Kritayugma*. In the case of *Kalyojah*, ninety-three is added to the *parva-rāśi*; in the case of *Dvāpara* it is sixty-two; in *Tretā*, it is thirty-one; and in the case of *Kritayugma*, there is no *prakshepa* or addition. When half of the remainder is

multiplied by thirty and is divided by sixty-two, know that the quotient indicates the time in Muhūrtas of the expiration of the parva.

Commenting on the above Malayagiri says:

Parva means parva-rāsi-number. When this number, divided by four, leaves a remainder, one, it is called Kalyojan; when the remainder is two, it is Dvāpara-yugma; when it is three, it is called Tretaujah; and when there is no remainder, it is called Kṛtāyugma, in the case of Kalyojorāsi, 93 is added to the remainder, making it 94; in the case of Dvāpara it is 62; in the case of Tretaujah, it is 31; and in the case of Kṛtāyugma, there is no addition or *prakshepa*. The resulting numbers after the addition are divided by 124. Then what the rule says is this:

The remainder is divided by 124 and is multiplied by 30; and the whole is reduced to half, as both the numerator and denominator is divisible by two. Then the product shows the number of *muhūrtas* and *muhūrtabhāgas*. The disciples are thus told to consider the expiration of the parva at the close of the *muhūrtas* and *muhūrtabhāgas*, just arrived at, on the last day. The following examples make the meaning clear:

Suppose one asks at the close of how many *muhūrtas* on the last day does the first Parva expire? Then we take 1, as the number of *Parvas* is one; as it is Kalyojah, we add 93 to it; it becomes 94; we divide this by 124; it is not divisible, as the number is less; then reducing it by 2 and multiplying it by 30, we have $47 \times 30 / 62$; it is equal to $1410 / 62 = 22$ *muhūrtas* and 23 parts of 31 divisions of a *muhūrta*. This means that the first parva

was completed after 22 *muhūrtas* and 23 parts of 31 divisions of a *muhūrta* on the last day of the Parva. Likewise, the second Parva was completed after $64 \times 30/124 = 32 \times 30/62$; it is equal to $960/62 = 15$ *muhūrtas* and 15 parts of 31 divisions of a *muhūrta*; similarly the third Parva attains completion at the close of $34 \times 30/124 = 17 \times 30/62 = 510/62 = 8$ *muhūrtas* and 7 parts of 31 divisions of a *muhūrta*. In the case of the 4th Parva no addition is made. It attained completion at the close of $4 \times 30/124 = 30/31$, or 30 parts of 31 divisions of a *muhūrta*. If the time of the 124th Parva's completion is asked, then $124/124 = 1$; thus there is no fraction. It means, therefore, the Parva in question was completed at the close of the day, that is at the close of 30 *muhūrtas* of the day.

Here the Prakshhepa or addition of 93, 62, 32 to Kali, Dvāpara and Tretā is merely the fractional Parva-Raśi numbers corresponding to those Parvas. As a yuga of 5 years consists of $5 \times 366 = 1830$ days distributed in 124 Parvas, a Parva is equal to $1830/124 = 14$ days and 94 parts of 124 divisions of a day; this is called Kaliparva or Kaliyuga. Similarly the second Parva is $1830 \times 2/124 = 29$ days and 64 parts of 124 divisions of a day. Likewise the third Parva is $1830 \times 3/124 = 5490/124 = 44$ days and 34 of 124 divisions of a day. The fourth Parva is $1830 \times 4/124 = 59$ days and 4 of 124 divisions of a day. The 124th Parva is $1830 \times 124/124 = 1830$ th day complete. Evidently the Vedic poets gave the name Kali to that new moon or full moon which attained its completion at midnight; Dvāpara to that which attained completion just after sunset; Tretā to that which attained completion at midday; and Krita to that which attained

completion just at sunrise. From the above it is clear that the first Parva closes at or after three quarters or Pādas of the day ; the second after two quarters or Pādas of the day ; the third Parva after one quarter or Pāda of the day ; and the fourth Kṛita Parva just at sunrise. According to the Vedāṅgajyautisha (Verses 12-14) a pāda is equal 31 Kalās which is exactly one-fourth of 124 Kalās of a Parva day. We are told that the Parva day closing at one, two, or three quarters of the day should be rejected (dyu heyam Parva chetpāde), and that Parva day which closes at sunrise or within one-fourth part of a day should be observed. In other words Kṛita Parva was observed and Tretā, Dvāpara and Kali Parvas were rejected and the Parva rite was performed on the previous day. This view is supported by what is stated in the Aitareya Brāhmaṇa (5-2-15). The passage is as follows—

कलिश्शयानो भवति सञ्जिह्वानस्तु द्वापरः ।

उत्तिष्ठन् त्रेता भवति चरन्सम्पद्यते कृतम् ॥

Kali is lying ; Dvāpara is retiring ; Tretā is standing up ; and Kṛita is moving. As Kali Parva closes at midnight, it is said to be lying fast asleep ; as Dvāpara closes at after sunset, it is said to be retiring from work abroad ; as Tretā closes at midday, it is said to be standing up and as Kṛita closes at or after sunrise it is said to be moving for work. Even now rites in honour of gods are performed on those days on which the Tithi closes before midday and ancestral rites (Pitṛikarma) are performed on the day on which the Tithi of the death of the ancestor closes at or after midday.

There can, therefore, be no doubt that the words Kṛita, Tretā and Dvāpara used in the Krishna Yaj.

(4, 3, 3) mean the Parvas of those names, as pointed above. Dr. Keith has, however, taken them to mean the throws of dice.

We are also told in the passage of the Satapatha Brāhmaṇa (XIII, 3, 2, 2) that the sacrificer of the Vedic times attained his firm foundation by 'Chatuṣṭoma' and by Kṛita among dice. The information so far gathered by a number of Oriental scholars regarding the game of dice is summarised by Prof. Eggeling in a note on his translation of the Satapatha Brāhmaṇa (Vol. IV, P. 107) as follows:—

"The allusions to the game of dice in the early literature are not sufficiently definite to enable us to form a clear idea as to the manner in which the game was played. Sāyaṇa, on Taitt. S. 1, 8, 16, remarks that the dice here used consisted either of gold *cowries* (shells) or of gold (dice shaped like) Vibhītaka nuts. That the brown fruit of the Vibhītaka tree (*Terminalia Bellerica*)—being about the size of a nutmeg, nearly round, with five slightly flattened sides—was commonly used for this purpose in early times, we know from the Ṛigveda; but we do not know in what manner the dice were marked in those days. According to the commentators, the game is played with five dice, four of which are called Kṛita, whilst the fifth is called Kali; and if all the dice fall uniformly (*ekarūpa*)—i.e. with the marked sides either upwards or downwards—then the player wins, and in that case the Kali is said to overrule the other dice. In this case the Kali would seem to represent the king. Kāty. Sr. S. XV, 7, 18-19, however, admits of another mode of playing, by which the Kali represents the Sajāta tribesman, whilst the king and those that come

after him (in the enumeration in paragraphs 15-20) play the Kṛita, &c., To understand this mode we have probably to turn to Chānd. Up. (IV, I, 4) where it is said of the saint Raikva, that everything good fell to him, just as the lower dice (or casts) submit to the conquering Kṛita. Here the commentators assign the names Kṛita, Tretā, Dvāpara, and Kali to different sides of the dice, marked respectively with 4, 3, 2, and 1 marks. (anka).—In Taitt. Br. I. 7, 10, the game at dice at the Rājasūya, is referred to as follows:—With 'this king has overcome the regions' he hands (to the king) five dice; for these are all the dice: he hereby renders him invincible. They engage to play for a dish of rice (ödāna), for that is (a symbol of) the chief: he thus makes him obtain every prosperity. He addresses them (with the epithets of) 'far-famed, most prosperous, true king.' The commentary and the Sūtras then supply the following explanation:—'The keeper of the dice (akshāvāpa) having (marked off and) raised the gambling ground (by means of the wooden sword), and sprinkled it, throws down more than a hundred or more than a thousand gold dice. From them he takes five dice and hands them to the king: these, as representing the five regions, are taken to include all those dice.' These explanations, so far from clearing up the doubtful points, seem rather to add to them. It may be noted, however, that in the well-known hymn Rik. S. X, 34, in which the gambler's state of mind is pictured in a very expressive language, the dice of the game are apparently spoken of as Tripanchāśa-vrata, or 'the troop of fifty three' (or thrice five, according to Ludwig's rather improbable conjecture)."

The above remark of Prof. Eggeling leaves no doubt about the prevalence of the game of dice from the earliest down to our own times. But the manner in which the game was played in ancient times cannot certainly be the same as it is now. Now-a-days two rectangular pieces of ivory or horn marked on each of the four sides with 6, 4, 2, and 1, are thrown on the ground; and each player leads his eight dice-men through 54, 60, or 72 out of 96 houses marked on a piece of cloth, by taking one or two dice-men at a time through as many houses as the number on the surface of the two thrown pieces. If the number on the thrown pieces is such as leads one or two dice-men of a player to the same house as is occupied by one or two of his opponent's dice-men, then the latter takes back his dice-men to the first house again and begins his play afresh with the defeated pieces. But in ancient times the method of play was quite different. The game of dice formed part of the sacrificial ceremony connected with the establishment of the sacred fire. Taking a cow belonging to the sacrificer, a number of players used to go along the streets of a town or village, and making the cow the stake, they used to play at dice in different batches with those who deposited grain as their stake. Each player used to throw on the ground a hundred or more *cowries* (shells); and when the number of the *cowries* thus cast and fallen with their face upwards or downwards, as agreed upon, was exactly divisible by four, then the sacrificer was declared to have won; but if otherwise, he was defeated. With the grain thus won, four Brāhmans used to be fed on the day of sacrifice. That this was the nature of the custom that prevailed in those days, is clear from the following Sūtra of Āpastamba and Agniswāmi's commentary thereon.

कृतेन यजमानो विजिनाति ॥ Āp. Śr. S. V, 20, 1.

"The sacrificer wins by Kṛita."

The commentary runs as follows—

कृतत्रेताद्वापरकलिनामानो द्यूतप्रकारा ये कृतमायानामिति श्रुतावया इत्याख्यायन्ते । न्युत्सेष्वक्षेषु चतुष्कशो विभज्यमानेषु यत्र सर्वे भागास्समा भवन्ति तत्कृतं नाम । अथ यत्राततस्त्रयोवशिष्यन्ते सा त्रेता । यत्र द्वौ स द्वापरः यत्रेकस्सकलिः । तथा च श्रुतिः 'ये वै चत्वारस्स्तोमाः कृतं तत् । अथ ये पंच कलिस्सः' इति । तत्राक्षाणां शतत्वात् कृतेन प्रकारेण यजमानो विजिनाति विजयते.

"Kṛita, Tretā, Dvāpara, and Kali are the names of the different forms of the game of dice as referred to in 'Kṛita among the forms of dice-play,' (Kṛishṇa Yajus IV, 3, 3). When the number of dice thrown can be arranged into groups of four each and all the groups consist of the same number, it is called Kṛita; and when there is a remainder of three at last, it is Tretā; when two, it is Dvāpara; when one, it is Kali. Accordingly the Veda (Taittirīya Brāhmaṇa I, 7, 10) says:—'That is Kṛita which consists of groups of four each; and that is Kali which consists of five.—As here there are a hundred dice it is by the form of Kṛita play that the sacrificer wins.'"¹

It is, therefore, clear from the above passages that the word, 'Kṛita,' whether used in connection with Parvas or dice, was a name signifying a set of four or multiples of four; that the word 'Tretā' was a name given to three or any number which, when divided by four, left a remainder three; that the word Dvāpara was a name

¹ Compare Mahidhara's Commentary on *Vajasaneyi Samhita*, X, 2, 8, and X, 30.

given to the number two or any number which, when divided by four, left a remainder two; and that Kali signified one or any other number which, when divided by four, left a remainder one.

The recurrence of Kṛitayugma, the same as Kṛitayuga, either in the dark half or light half of the month is also alluded to in the Bhagavatī Sūtra. Surprised, perhaps, at the thought that though born on the auspicious day of the Kṛitayugma, some persons commit sin and are thereby destined to hell, Gautama addresses Mahāvīra as follows:—

कण्हपक्खयरासिजुम्मणेरयियाणं भंते कनु उववज्जंति ? सुक्ख-
पक्खयरासिजुम्मकयजुम्मणेरयियाणं भंते कनु उववज्जंति ॥¹

"Why are persons destined to hell born on the day of Kṛitayugma in the dark half of the month, O, lord? And why are they born on the day of Kṛitayugma in the light half of the month, O, lord?"

Mahāvīra's answer to this question is not of so much importance to us as the question of Gautama referring to the occurrence of Kṛitayugma in the dark or light half of the month. It need not be explained that what Gautama meant by a Kṛitayugma in the light or dark half of the month was the close of the Parva of that name at sunrise or before midday, in the light half or dark half of the month.

1 P. 1931 *Bhagavati Sutra*.

"The date of the collection, or perhaps more correctly, the composition of the Jaina Canon would fall somewhere about the end of the fourth or the beginning of the third century B.C." P. 43, Preface to Translation of the *Achārāṅga Sutra of the Jainas* by Hermann Jacobi.

Whether the game of dice was also played in connection with the laying of Apānabhṛit bricks on the altar reciting the Yajurmantra (4, 3, 3) which contains Kṛita and other Parva words, is a question which cannot be definitely answered. As the names of seasons, number of months and sets of intercalary days are given in that passage, I am inclined to think that Kṛita and other words in the passage signify Parvas rather than games of dice. The word 'Trivṛit' means a set of nine days as well as a set of nine verses. Eighteen lunar months differ from eighteen solar months by 18 days which are divided into two sets of nine days each; and one set of the nine days is inserted before, the central day and another after the central day of the year. Likewise in the course of $3\frac{1}{2}$ years the difference between the two years amounts to 42 days, of which 30 days are divided into two sets of 15 days each and inserted before and after the central day of the year, as before, leaving the remaining 12 days to be disposed of later. Likewise in the course of six years the difference amounts to 72 days, in which 68 days are divided into sets of 17 days each; and of these, two sets of 17 days are inserted before the central day and the other two sets after the central day of the year. The remaining 4 days are carried forward to be adjusted in the 9th year. In the 9th year the difference of 108 days between the lunar and the solar years are split into sets of 21 days each, half of them being inserted before and the other half after the central day. Here also the number of days that remain are carried forward to be treated of in the 12th or the 13th year. This seems to be the meaning of the passage. It is as follows:—

(1) "The East of the quarters; the spring of the seasons; Agni the deity; holy power the wealth; the Trivrit the Stoma, and it forming the path of the fifteenfold Stoma; the eighteen month old calf the strength; the Kṛita of the throws of dice; the east wind the wind; Sanaga the Rishi.

(2) The South of the quarters; the summer of the seasons; Indra the deity; the kingly power the wealth; the fifteenfold the Stoma, and it forming the path of the seventeenfold Stoma; the two year old calf the strength; the Tretā of the throws; the South wind the wind; Sanātana the Rishi.

(3) The West of the quarters; the rains of the seasons; the All-gods the deity; the peasants the wealth; the seventeenfold the Stoma, and it forming the path of the twenty-one-fold Stoma; the three-year old the strength; the Dvāpara of the throws; the West wind, the wind; Ahabuna the Rishi.

(4) The North of the quarters; the autumn of the seasons; Mitra and Varuṇa the deity; prosperity the Stoma, and it forming the path of the twenty-seven-fold Stoma; the four-year-old the strength; the Āskanda of the throws; the North wind, the wind; Pratna the Rishi.

(5) The zenith of the quarters; the winter and the cool season of the seasons; Bṛhaspati the deity; radiance the wealth; the twenty sevenfold the Stoma, and it forming the path of the thirty three-fold; the draught ox the strength; the Abhibhū of the throws; the wind all through the wind; Suparṇa the Rishi."

The question that is under consideration is not, however, the meaning of the passage of the Kṛishṇa

Yajurveda quoted above. The main question under our consideration is whether the words, Kṛita Yuga, Tretāyuga, Dvāparyuga, and Kaliyuga are anywhere used in the sense of a Parva of fifteen Tithis. I think that the consideration of the quotations made from the Sūryapraghnapti and the Vedāngajyautisha leaves us in no doubt as to the use of those words originally in the sense of a Parva of 15 Tithis terminating at sunrise, at midday, at evening or at midnight. It follows, therefore, that the word Yuga once meant a Parva of fifteen days also. Accordingly the word Yuga in the phrase of 'Yugasahasra' of a Brahmakalpa may be taken in any of the four senses. It remains now to be decided which of these four meanings is historically sound. According to the Padma Purāṇa passage quoted above there had passed away three thousand Yugas equivalent to three Brahmakalpas and six Manvantarās equivalent to four hundred and twenty six Yugas, together with twenty eight Yugas in the seventh Manvantara, in short three thousand and four hundred and fifty four years. Taking the Yuga in each of the four senses, we have—

$$(i) \ 3454 \text{ Yugas} = 3454 \times 43,20,000 \text{ years} \\ = 14,92,12,80,000 \text{ Years.}$$

$$(ii) \ 3454 \text{ Yugas} = 3454 \times 5 \text{ Years} = 17,270 \text{ Years.}$$

$$(iii) \ 3454 \text{ Yugas} = 3454 \times 1 \text{ Year} = 3,454 \text{ Years.}$$

$$(iv) \ 3454 \text{ Yugas} = 3454 \times 1/24 \text{ Years} = 143\frac{11}{12} \text{ Years.}$$

References to Brahmakalpa are found in the Sukla Yajurveda 20, 4. It is as follows:—

"In the beginning rose Hiranyagarbha, born, only Lord of all created beings."

"He fixed and holdeth up this earth and heavens."

Reciting this verse, the sacrificer puts down a lotus leaf on the altar ground, a piece of gold on the lotus leaf and a golden figure of man on the lotus to represent Hiranyagarbha Brahma, or Prajāpati, the God of time. Similarly the Tait. Āra. (1, 25) Speaks of a lotus leaf, a piece of gold and a golden figure of man being laid down in the pit of an altar ground. In Kṛishṇa Yajurveda (5, 2, 7) the sacrificer is required to lay down a gold disc in the pit of the altar ground and a golden figure of man on the disc to represent the creation of Brahma, the Creator. The great fire altar described in the fourth Kāṇḍa of the Kṛishṇa Yajurveda seems to symbolise the closing the Padma Kalpa of Brahma.

The names of the fourteen Manūs mentioned in the Purāṇas are —

- | | |
|----------------|-------------------|
| 1. Svāyambhuva | 8. Sūryasāvarṇi |
| 2. Svārochisha | 9. Dharmasāvarṇi |
| 3. Uttama | 10. Dakshasāvarṇi |
| 4. Tāmasa | 11. Rudrasāvarṇi |
| 5. Raivata | 12. Brahmasāvarṇi |
| 6. Chākshusha | 13. Indrasāvarṇi |
| 7. Vaivasvata | 14. Vedasāvarṇi |

These and other references to a Kalpa of 1000 years, Parvas or days divided into 14 periods of 71 or 72 years, Parvas or days, called Manvantarās or reigns of Manus establish that something like an era of Manvantaras, started synchronously with the eras of the cycles of sixty and of thirtythree years in B. C. 3101 was current in India till A.D. 353.

What, however, is to be borne in mind is the division of 1,000 into 14 Manvantarās of 71 or 72 Yugas or Parvas

each. Now let us see how this era is connected with the cycles of 20 and 33 years.

The Vedic Cycle of Thirty Three Years:—

The Vedic Poets seem to have been observing a grand cycle of 33 lunar years made up of six smaller cycles for adjusting the lunar year of 354 days with the solar year of 365 days. The Vedic terms in which the cycles are spoken of in the Vedas are so enigmatic as to defy interpretation. Still a comparative study of all the parallel passages found in the various schools of the Yajurveda will not fail to unravel the astronomical and religious mysticism of the Vedic poets. The passages taken for comparative study are Krishna Yajus. 4, 3, 3; 4, 3, 5; Maitra. S. 3, 11, 11; Śukla Yajus. 14, 10; 18, 27-27; 21-12-28; 24, 12-13; 28, 24-34. The passage of the Krishna Yajus runs as follows:—

(1) "The East of the quarters; Agni the deity; holy power the wealth; the Trivrit the Stoma, and it forming the path of the fifteenfold Stoma; the eighteen-month old calf the strength; the Krita of the throws of dice; the east wind the wind; Sanaga the Rishi."

(2) "The South of the quarters; the summer of the seasons; Indra the deity; the kingly power the wealth; the fifteenfold the Stoma, and it forming the path of the seventeenfold Stoma; the two-year-old the strength; the Tretā of throws; the South wind the wind; Sanātana the Rishi."

(3) "The West of the quarters; the rains of the seasons; the All-gods the deity; the peasants the wealth; the seventeenfold the Stoma, and it forming the path of the twenty one-fold Stoma; the three-year-old the

strength; the Dvāpara of throws; the West wind the wind; Ahabuna the Rishi."

(4) "The North of the quarters; the autumn of the seasons; Mitra and Varuṇa the deity; prosperity the wealth; the twenty-one-fold the Stoma, and it forming the path of twenty-seven-fold Stoma; the four-year-old the strength; the Āskanda of throws; the North wind the wind; Pratna the Rishi."

(5) "The zenith of the quarters; the winter and the cool season of the seasons; Brihaspati the deity; the radiance the wealth; the twenty seven-fold the Stoma, and it forming a path of the thirty-three-fold; the draught-ox the strength; the Abhibhū of throws; the wind all through the wind; Suparṇa the Rishi."

There are six minor cycles clearly stated in the above passage. The first is a cycle of 18 months (lunar), which falls short of 18 solar months by 18 days. According to the Laṭyāyana Srauta Sūtra (4, 6, 12, 10 and the Śatapatha Brāhmaṇa) 9 days are inserted before the central day of the year and 9 days after the central day. It is these 9 days which are here called 'Trivrit Stoma.'

The second is the cycle of $3\frac{1}{2}$ years with 42 intercalary days. Of these 30 days are disposed of by adding 15 days before the central day of the year and 15 days after it. The remaining 12 days are reserved for the seventeen-fold Stoma. This is the meaning of the word 'Saptadaśavartani', forming the path of the seventeenfold Stoma.

The third cycle is a cycle of 6 years with $12 \times 6 = 72$ intercalary days. Of these two sets of seventeen days are added before the central day and 2 sets after the central day. The remaining 4 days are reserved to be disposed

of in the next cycle of 9 years. The intercalary days of the next cycle are $12 \times 9 = 108$, which form 5 sets of 21 days each nearly. As in other cycles they are disposed of by adding about 52 days both before and after the central day of the cycle, 3 days being reserved for the next cycle. The next is the cycle of 13 years ($1\frac{1}{2} + 2 + 2\frac{1}{2} + 3 + 4 = 13$) with 156 intercalary days of which 5 sets of 27 days each are disposed of as before and 21 days are reserved for adjustment in the next cycle of 17 years. ($1\frac{1}{2} + 2 + 2\frac{1}{2} + 4 + 3 + 4 = 17$).

The number of intercalary days in this cycle are $12 \times 17 = 204$ days; which are disposed of by adding 3 sets of 33 days both before and after the central day of the cyclic year.

The adjustment of the lunar year with the solar year by adding to the lunar year one or two sets of 9, 15, 17, 21, 27 and 33 days reserving at the same time a few days is evidently to equalise the actual and theoretical difference between the two kinds of years. By the repetition of the same process for another 16 years, the cycle of 33 years is completed bringing the solar and lunar years to the same starting point. Each year is called a god and the cycle of 33 years is called a set of 33 gods. If even after 33 years the two years were not found to come to the same starting point, the cycle was continued for another year and somehow or other equalized at the close of the 34th year. Accordingly Prajāpati, the god of the cyclic year is sometimes called '33'. (Tait. S. IV. 6, 9). Seventeen which is half of thirtyfour is also another important number frequently used to signify Prajāpati, the Year-God, just as the Vedāngajyautisha calls Prajāpati the lord of the five years' cycle.

The necessity for the division of the cycle of 33 years into sub-cycles is not merely the convenience of adjusting the two years at easy intervals, but the recurrence of certain astronomical and natural phenomena at those intervals. These phenomena are specified in the grand 'Apri' hymn of the White Yajus (28, 24-34) which runs as follows:—

"Let the priest worship Agni, Indra, kindled, excellent strength-giver, lending him mighty power, Gāyatri metre, a cow aged eighteen months and vital vigour. Let him enjoy the butter, Hotar, worship. (24.)

Let the priest serve with sacrifices him who breaks forth, Tanūnapāth, the germ which Aditi conceived, pure Indra who bestoweth strength, bringing him mighty power, the Ushnih metre, an ox two years old, and of vital vigour. Let him enjoy the butter, Hotar, worship. (25.)

Let the priest sacrifice to Soma, Indra, adorable, adored, best Vritra-slayer, strength-giver, mighty, to be adored with viands, bringing him mighty power, Anushtup metre, a cow of thirty months, and vital vigour. Let him enjoy the butter, Hotar, worship. (26.)

Let the priest worship Indra, strength-bestower, immortal, with fair grass, allied with Pūshan, seated on sacred grass, dear, everlasting, bringing him mighty power, Brihati metre, a steer of three years' age and vital vigour. Let him enjoy the butter, Hotar, worship. (27.)

Let the priest worship the wide-opening Portals, easy to pass, divine, law-strengthening, golden, Indra, the Brahman priest, the strength-bestower, bringing him

mighty power, the Pankti metre, a bullock four years old and of vital vigour. Let him enjoy the butter, Hotar, worship. (28.)

Let the priest worship lofty Night and Morning, well decked, of varied hue, lovely to look on, Indra, the Universal, strength-bestower, bringing him mighty power, the Trishṭup metre, a bullock, four years old and of vital vigour. Let him enjoy the butter, Hotar, worship. (29.)

Let the priest worship both celestial Hotars, the gods' best glory, sages famed for wisdom, the two companions, Indra strength-giver, bringing him mighty power, Jagati metre, an ox that draws the wain and vital vigour. Let him enjoy the butter, Hotar, worship. (30)

Let the priest sacrifice to the three well decorated goddesses, gold-decked, lofty, Bhāratis, Indra, their lord who gives strength, bringing him mighty power, Virāj, the metre, and a cow in milk. Let him enjoy the butter, Hotar, worship. (31)

Let the priest worship Tvashtar, the prolific, strengthener of growth, maintaining varied growth and form, Indra who gives vital force, bringing him mighty power, Dvipād metre and an ox full grown. Let him enjoy the butter, Hotar, worship. (32)

Let the priest worship the forest lord Vanaspati, the Immolator, hundred-powered, praiseworthy, golden leaved, who wears the girdle, loved, the gracious lord, Indra, who gives the strength of life, giving him mighty power, Kakup metre, a barren, calf-slipping cow, and vital vigour. Let him enjoy the butter, Hotar, worship. (33).

Let the priest offer worship to the Svāhākṛiti goddesses, to Agni House-hold lord apart, to Varuṇa the leech, and sage, mighty Indra who bestoweth strength, bringing him mighty power, Atichhandas metre, a strong bull in his prime, and vital vigour. Let them enjoy butter, Hotar, sacrifice. (34)

Here in the six verses from 24 to 29 the number of years given is 17 and in verses from 30 to 34 no years are given, but only sacrificial victims are named. In S. Yajus. 21, 12-17, however, the number of years given comes to 19. The verses run as follows:—

“Kindled is Agni with the brand, yea, kindled well, the excellent; the metre Gāyatri, the steer of eighteen months, give power and life. (12)

Tanūnapāth whose acts are pure, our bodie's guard Sarasvatī, Ushṇihā metre and the steer of two years age give power and life. (13)

Agni with offerings, meet for praise, and Soma the immortal god, Anusṭup metre, and the steer of thirty months, give power and life. (14)

Agni with goodly grass spread out, deathless with Pūshan at his side, Bṛihati metre and a steer of three years age, give power and life. (15)

The Doors divine, the mighty regions, Brahma, god Bṛihāspati, the metre Pankti, here a bull in his fourth year, give power and life. (16)

The two young Dawns of lovely form, the deathless universal gods, the Trisṭup metre, here a bull in his sixth year, give power and life. (17)

The two celestial Hotars, both physicians, Indra's close-knit friends, the metre Jagatī, an ox who draws the wain, give power and life. (18)

The three Idā, Sarasvatī and Bhārati, the Marut folk, Virāj the metre, here a cow in milk, a bull, give power and life. (19)

Tvashtar, the wondrous, full of seed, Indrāgnī furtherers of weal, Dvipāda metre, a cow and a vigorous bull give power and life, (20)

Our slaughterer Vanaspati, Savitar who promoteth wealth, the metre Kakup, here a cow who casts her calf, give power and life. (21)

Here the number of years given is $1\frac{1}{2} + 2 + 2\frac{1}{2} + 3 + 4 + 6 = 19$. The remaining four bulls for which no age is given may be taken to signify 14 years, making the total 33 years.

While in the above passages of the S. Yajurveda age-grades are given in terms of cows and bulls, the M. S. II. 7, 20 and the Tait. Brāh. II 6, 17, substitute Tryavi (three sheep), and Panchāvi (five sheep) for 'a calf of 18 months', and 'a bull of 30 months; respectively. Solar eclipses are called Avis, sheep.

These thirty three years are described as thirty three gods, made up of 11 on the earth, 11 in the atmosphere and 11 in the sky and the total number of such gods is stated to be 3,349 in the Tait. Brāhmaṇa (III. 11, 3, 25), while in the Śukla Yajurveda (XXXIII, 7) only 3,339 gods are stated to have worshipped Agni.

There are two more points deserving consideration in the Śukla Yajurveda passage (28, 24-34) quoted above. They are—

(a) the Samiddha and other nine gods of the Aprī Verses and

(b) the metres assigned to the months of the Samiddha and other gods.

In verse 24 a cycle of 18 months is mentioned as the time of kindling the fire. No season is mentioned. The mention of the Gāyatrī metre, however, indicates the gnomon's shadow of 24 Angulas. It is probably the rainy season, the time being the full moon or the new moon of the month of Śrāvaṇa. The fire or the sun of this season is called Samiddha, well kindled.

In verse 25 the fire or the sun is called Tanūnapat, son, born of himself; the Ushnih-metre of 28 syllables indicates the time of the full-moon or the new-moon of the month of Bhādrapada. It is two years with 30 intercalary days after the time of the Samiddha or Kindled fire.

In verse 26 the name of the fire or the sun is 'Narāśamsa,' praise of men. It is more clearly stated in verse 3 of this hymn than here. The shadow measure is 32 Angulas and the month is Aśvayuja, the time of autumnal equinox. The time is 30 months after the time of the Tanūnapāth fire or six years from the beginning. During the rainy season no Vedic hymns are chanted on account of frequent thunders and lightnings when silence is enjoined. In the month of Aśvayuja the fury of the rains is at an end and the priests are glad to resume their Vedic recitation. Hence, the autumn months are called time of speech. In verses 6-8, Book 3 of the White Yajus the same time is spoken of as the time of the arrival of the spotted cow or bull before the

arrival of the Mother and the Father, (the solstices) mounting up to heaven (the equinoctial heaven). He is clearly spoken of as 'ruling thirty stations,' the 30 Muhūrtas of the equinoctial day. It is then that 'speech or song is bestowed on the Bird, the sun or the fire.

In verse 27 the time of the grass or 'Barhis' is mentioned. The shadow measure is 36 Angulas and the month is Kārtika. It is in this month that the sacrificial grass is ripe for cutting. It is a cycle of 9 years.

In verse 28 the month that is indicated is 'Mārgaśīrsha' with its shadow measure of 40 angulas; when, we are told, the portals of the heaven are opened. The month being that of the season of winter solstice, the heavenly doors are said readily opened for the entrance of the departed souls of the good. The time is four years after the previous cycle of 9 years; that is, a cycle of thirteen years, when the number of accumulated intercalary months comes to be five.

In verse 29 we are told that the shadow measure is 44 angulas. Accordingly it is the month of Pushya, the sixth from Śrāvaṇa. The cycle that is devised is that of 17 years or $16\frac{1}{2}$ years when the number of intercalary months amounts to six. If no adjustment is made, the beginning of the unadjusted lunar year falls back by six months and the solstitial periods are reversed, that is, the winter solstice takes the place of summer solstice. The Nakta or the night period from summer solstice to winter solstice becomes the Ushasa period of six months from winter solstice to summer solstice. The priests would be obliged to speak of Ushasā-nakta instead of speaking of Naktoshasā as usual.

In verse 30 the shadow measure is said to be 48 Angulas in the mouth of Māgha when gods are called upon by the Hotris to assemble in the sacrificial hall. The number of the years composing the cycle is not, however; mentioned.

In verse 31, the metre mentioned is Virāj of 30 syllables which indicates a fall of about 18 Angulas from 48 Angulas of the Hotri month mentioned before. Accordingly it is the beginning of the season of the vernal equinox which is a time of speech, Sarasvatī. Here also the number of the years composing the cycle is not mentioned. It is probably seven or eight years after the last cycle of 17 years, for the vernal equinox comes three months after the winter solstice and because there are three intercalary months in 8 years. It is also the time when the sun has come down from the sky of winter solstice to the Earth or the spring season which is here called Idā. It is also the time of nourishment or 'Bhārati.' The Purushasūkta says (White Yajus. 31, 22) "Beauty and Fortune are thy (Vishṇu's) wives; each side of thee are day and night. The constellations are thy form; the Asvins are thy open jaws."

The Maitrāyaṇīya Samhitā (3, 2, 1) says explaining the verse "Naktoshasā," that the day and night are requested to return again with Ūrja, (Punarūrjānivartasva); bearing upon this, it says (4, 9, 14) that others substitute the verse "Udutyam chitram" for the verse "Punarrūrja nivartasva." In saying this the Maitrāyaṇīya Samhitā seems to mean that while some sacrificers pray for the return of the quinotial days (naktoshasā) in the month of Āśvina or Kārtika when the sun passes through the constellations Āśvini, Bharani

and Kṛittikā, others pray for the return of the day and night with the constellation 'Chitrā' and recite the verse "Udutyam-Chitram."

In 3, 42, the same Samhitā says that Kaṇa Srāva-yasa found out that the day and night are associated with the constellation Chitrā. In 4, 3, 10 and 44, 7 the Samhitā says that Vishuvān is Varuṇa and is associated with Chitrā. In 3, 8 and also in 3, 1, 6 and 3, 28 it says that the day is Mitra and that the night is Varuṇa; that the day is termed as 'Satya' and that the night is called 'Ṛita.' In this connection it is to be noted that of the two equinoctial days one happens in what is called the dark half of the year, that is, the six months from the summer solstice to winter solstice and that the other occurs in what is called the day-part of the year, that is, the six months from the winter solstice to the summer solstice. Hence, it is clear that the equinox in Āśvina or Kārtika was called night, Ṛita and Varuṇa and that the other equinox in Chaitra or Vaiśākha was called day, Satya and Mitra. In 3, 29 the M. Samhita further says that the Aśvinis have ceased to be physicians of the gods, because they have become promulgators of what is not klipta, established, and that the sacrifice to the Aśvins (on the day of vernal equinox) is now obsolete (Utsanna). This is evidently a reference to the precession of equinoxes. The poets were certainly unaware of the law of precession of equinoxes. Yet it cannot be denied that they could observe the change that has gradually taken place in the locus of equinoctial colure. They could certainly observe that the occurrence of day and night of equal length deviated from its original place in the constellations from Aśvin to Kṛittikā and that

it began to take place in a constellation that precedes the constellation that marked its occurrence before. Hence they seem to have called the Aśvins as 'Asatya', not the vernal equinox, while others persisted in asserting that they were 'na-asatyas', not-untrue."

The term 'Maitrāyaṇīya', itself suggests that it is the Samhitā of those who once observed the autumnal equinox in the Mitra or Anurādhā constellation. The Atharvaveda (19, 7) refers in distinct terms to the occurrence of the equinox in the 'Chitras.' "The Chitras are together in the sky and the serpents in the earth."

In verse 32 god Tvashṭri is the deity and the metre is Dvipād of 10 syllables, indicating a shadow of about 10 Angulas. Hence the month must necessarily be that of summer drawing near to the summer solstice. Next in verse 33 the metre is Kakup of 8 syllables, less than that of the previous month by about 2 syllables or Angulas. Hence it seems to close the summer nearly after the vernal equinox. The interval between the vernal equinox and the close of the summer is about 5 months. As three intercalary months occur in the course of $7\frac{1}{2}$ or eight years, it follows that the interval from the sacrificial time of the three goddesses to the end of the sacrificial time of Vanaspati or the Forest-lord is about 8 years. Accordingly the period of Tvashṭri and Vanaspati including the periods of Hotri and three goddesses preceding comes to 16 years, which with the seventeen years to the end of the period of Naktoshasī makes 33 years.

Thirty-three lunar years are equal to $33 \times 354 = 11,682$ days. Since thirty-two solar years of 365 days each are equal to $32 \times 365 = 11,680$ days, it follows that

33 lunar years are equal to 32 solar years. The thirty-third lunar year is an intercalary year and is here divided into ten periods called—

- | | |
|----------------------|---|
| 1. Kindled Fire ; | 6. Day and Night ; |
| 2. Tanūnapāth ; | 7. The Divine Hotris ; |
| 3. Narāśamsa ; | 8. The three goddesses
Idā, Sarasvatī and
Bhārati ; |
| 4. Barhis or Grass ; | 9. God Tvashtṛi ; and |
| 5. Divine Doors ; | 10. Vanaspati. |

In interpreting the Āpri verses as meaning the above idea, I have given no place to imagination or etymological hair-splitting. I have simply pointed out what the Āpri verses can possibly mean as they are. These verses are found in the White Yajurveda in five places; 4, 10; 18, 26; 21, 1-39; 24, 12-13; 28, 24-33. A careful consideration of all these passages will leave no doubt that the various age-grades mentioned in them are minor cycles making up a big cycle of 33 lunar years.

Metres, when applied to months, seem to signify the measure of the shadow cast by Purusha, a gnomon, in those months; for the shadow measures of the several months given in the Sūryapragṇapti, Kālalokaprakāśa and other Jaina astronomical works are identical with the Vedic metrical measure of those months. This is what the Kālalokaprakāśa says on the shadow measures of the months:—

“In order to know the shadow-measure of months and days in a Yuga or cycle of 5 years, a simple astronomical rule (Karaṇa) will be explained:—

The gnomon's shadow decreases in the Dakṣiṇāyana and increases in the Uttarāyana. A Śanku or gnomon is a wedge-shaped cube or the body of a man and is called Purusha. Its shadow is called Paurushī. The Nandichūrṇa says that Purusha means a gnomon or the body of a man. Paurushī is the shadow cast by anything equal to its own height; it is called Paurushī. This is so on the first day of the Dakṣiṇāyana. Thereafter, the Paurushī increases and will be twice as much on the first day of the Uttarāyana. Thereafter it decreases till it becomes equal to the height of the body casting it. In the Dakṣiṇāyana it goes on decreasing at the rate of $1/183$ part every day and increases at the same rate in the other Ayana. For example, a gnomon of 24 angulas in height casts a shadow of 24 angulas in length in the beginning of the Dakṣiṇāyana; and then it goes on increasing, as stated above, at the rate of $1/183$ of its height a day. Now if the increase in 183 days is 24 Angulas, then in one day it will be $24/183$, i.e., $8/61$. Then in $30\frac{1}{2}$ days of a solar month, the increase will be $8/61 \times 61/2$ i.e., 4 Angulas. Accordingly the ancients say that in every month of the two Ayanas the increase or decrease is 4 Angulas. Here the month is solar. Hence in three months the increase will be $4 \times 3 = 12$; in six months $6 \times 4 = 24$ Angulas, which is equal to the height of a gnomon. On the first day of the Uttarāyana, it will be 48 Angulas, that is, twice the height of a gnomon. Hence on the Dakṣiṇāyana it measures two Pādas which is equal to the height of the knee-joint from the foot. A Pāda or Pada is 12 Angulas. Two Padas is a constant in the decrease in the Dakṣiṇāyana; and the increase in the other Ayana is 4 Padas and it is constant.

On the first day of the dark half of the month of Śrāvaṇa in the first year of a cycle of 5 years the shadow measure is two Pādas; and it will go on increasing till on the seventh day of the dark half of the month of Māgha it measures 4 Pādas. Then increase commences on the 13th day of the dark half of Śrāvaṇa in the second year. The decrease begins on the 4th of the white half of Māgha. Thereafter the increase begins on the 10th of the white half of Śrāvaṇa; and the decrease begins on the first day of the dark half of Māgha. In the 4th year, the increase commences on the 7th of the white half of Śrāvaṇa and the decrease begins on the 13th of the dark half of Māgha. In the 5th year it begins to increase on the 4th of the white half of Śrāvaṇa and to decrease on the 10th day of the white half of Māgha. The rate of increase or decrease per day is $\frac{8}{61}$ of an Angula; and for seven days it is $8/61 \times 7 = \frac{56}{61}$ = an Angula— $1/5$ of an Angula; the same per 15 days is $8/61 \times 15 = \frac{120}{61} =$ two Angulas— $2/5$.

As to the statement made in some works that the increase or decrease will be an Angula in 7 days; and two Angulas in a Paksha, this is only a rough measure for popular use. For, the commentator on the Uttarā dhyayana Sūtra says that "an Angula by seven days should be taken to mean an Angula by seven days and a half." This comes to an Angula minus $8/61$ of an Angula. In thirty days it amounts to $240/61 = 3\frac{57}{61} = 4 - \frac{4}{61}$. Hence, 4 Angulas should be lessened by $4/61$ of an Angula. Accordingly if $4/61$ of an Angula relating to half a day is added to 30 days, it will be $4 - 4/61 + 4/61 = 4$ Angulas for $30\frac{1}{2}$ days of a solar month. Accordingly an increase or decrease of one Pāda or 12 Angulas in three months

there will be. In one Ayana or 6 months, there will be an increase or decrease by two pādas. In the Jyotishkaranda 4/31 of an Angula is stated to be the rate of increase or decrease. This should, however, be taken to relate to Tithis, but not to days. What is stated here in this work holds good with reference to days. For 31 Tithis are equal to $30\frac{1}{2}$ days. This has already been shown above. There is an increase or decrease of 4 angulas in $30\frac{1}{2}$ days or 31 Tithis. For 4×31 is equal to 124. This divided by 31 gives 4. The excess of a part of a Tithi month by month (solar) should be inferred. Thus in 61 solar days there are 62 Tithis. In each Ayana of 183 days there are 186 Tithis. The increase of 4/31 of an Angula a day can be verified arithmetically. If in 186 Tithis there is an increase or decrease of 24 Angulas, then in one Tithi it will be $24/186$ equal to $4/31$ of an Angula.

A rule or Karana to find out the Paurushi measure on a Tithi of a Parva will now be given:—

Take the number of Parvas that have elapsed and multiply it by 15 to obtain the number of Tithis elapsed. Add to this the number of Tithis that are there up to the Tithi in question. Divide the sum by 186. The quotient, if it is an uneven number, denotes Dakshināyana. If it is an even number, it is Uttarāyana. If there is a remainder, multiply it by four and divide it by 31, thus making 31 parts of an Angula. This corresponds to the daily Paurushi measure derived from the constant of two Pādas in the Dakshināyana or from the constant of four Pādas in the Uttarāyana.

Say what the Paurushi measure will be on the 5th Tithi of the 85th Parva of a cycle of five years? Here

$84 \times 15 = 1,260$ Tithis. Add 5 to this. Hence, the number of Tithis is 1,265. Divide this by 186. $1,265/186 = 6$ and $149/186$. Hence, it means that six Ayanas are passed and that the Dakshināyana is current. Now $149 \times 4 = 596$. This divided by 31 will give $596/31$ which equals 19 and $\frac{7}{31}$. And 7 multiplied by 8 will be 56 Yavas. This divided by 31 will be $56/31$ which equals 1 and $25/31$ of a Yava. As this relates to the Dakshināyana, this 7 angulas, 1 Yava, and $25/31$ of a Yava should be added to the constant of increase, that is, to two Pādas. Hence the answer is 3 Pādas, 7 Angulas, 1 Yava and $25/31$ of a Yava on the 86th Parva of the cycle.

To take another example,—What is the Paurushi on the 5th Tithi after 96 Parvas have elapsed?

Here $96 \times 15 = 1,440$. By adding 5 Tithis it will be 1,445 Tithis. Now, $1,445/186 = 7$ and $143/186$. Hence, it means that 7 Ayanas are passed and that the current Ayana is the Uttarāyana. Now $143/186 \times 4 = 572/186$. Now 572 divided by 31 gives 18 and $14/31$. Hence the Paurushi measure is one Pāda, 6 Angulas and $14/31 \times 8$ which equals 3 and $19/31$. As this is Uttarāyana, this should be deducted from the constant of 4 Pādas. Hence 4 Pādas—one Pada, 6 Angulas and 3 and $19/31$ of a Yava $= 2$ padas, 4 Yavas and $12/31$ of a Yava.

How to find a Tithi that has elapsed?—

Now the Tithi's measure is $4/31$ of an Angula. Hence 4 Angulas are equal to $4/31 \times 31$. Hence 31 Tithis have elapsed. Now if 4 Pādas are less by 8 Angulas, say how many Tithis in the Uttarāyana have elapsed? If $4/31$ of Angula is less, then it indicates one

Tithi. Hence 8 Angulas will give $8 \times 31/4$, which is equal to 62. Hence 62 Tithis have elapsed. When we say that Paurushi measure is less by a Pāda, it should be taken to mean 6 Angulas in the morning in the month of Jyeshṭha, Āshāḍha and Śrāvaṇa. In the 3 months of Bhādrapada, Āsvayuja and Kārtika, it will be 8 Angulas. In the three months of Mārgaśira, Pushya and Māgha, it will be 10 Angulas. And in the remaining three months 8 Angulas should be added.

If in the month of Pushya there is a shadow of a human body measuring 9 Pādas, then by every month it goes on decreasing by one Pāda. Hence in the month of Ashāḍha it will be 3 Pādas. In the same way the increase should be ascertained. If in the month of Pushya there is a shadow of one Vitasti in length, that is, 12 Angulas, then it means the forenoon of the day. Then it decreases at the rate of 2 Angulas per month; then in Ashāḍha at midday there will be no shadow; that is, it vanishes like the friendship of a wicked man. If in Pushya the shadow of a human body is 6 Pādas, then it will decrease by one Pāda per month till it vanishes in the month of Ashāḍha. Whatever is said here regarding a Paurushi shadow less by one Pāda, all that relates to the full-moon-day of the month in question."

From the above it is clear that if there is a shadow of two Pādas or 24 Angulas by the end of Ashāḍha when the Dakshināyana happens, the measure of the shadow on the Uttarāyana day in the month of Pushya or the beginning of the month of Māgha will be 4 Pādas or 48 Angulas. The monthly increase or decrease is at the rate of 4 Angulas. This is purely Vedic and holds good in the strides of Viṣṇu, Viṣṇu whose dwarf

incarnation is Vāmana seems to mean both the sun and a gnomon (Purusha).

This is how the strides of Vishṇu are described in the *Krishṇa Yajurveda* (4, 2, 1)—

"Thou art the step of Vishṇu, overcoming hostility, mount the *Gāyatrī* metre, step along the earth; excluded is he whom we hate. Thou art the step of Vishṇu, overcoming imprecations, mount the *Trishṭubh* metre, step along the atmosphere; excluded is he whom we hate. Thou art the step of Vishṇu, overcomer of the enemy, mount the *Jagatī* metre, step along the sky; excluded is he whom we hate. Thou art the step of Vishṇu, overcomer of the foe, mount the *Anuṣṭubhā* metre, step along the quarters; excluded is he whom we hate."

The *White Yajurveda* (2, 25) speaks of the strides of Vishṇu as follows—

"By *Jagatī* metre in the sky strode Vishnu; therefrom excluded is the man who hates us and whom we hate. By *Trishṭubh* metre in the air strode Vishnu. Therefrom excluded is he who hates us and whom we hate. By *Gāyatrī* upon the earth strode Vishṇu. Therefrom excluded is he who hates us and whom we hate." In the same way in *Book 12, 5*, the strides of Vishṇu are spoken of:—

"Thou art the rival-slaying stride of Vishnu. Mount the *Gāyatrī* metre; stride along the earth. Thou art the foe-destroying stride of Vishnu. Mount the *Trishṭubh* metre. Stride along the mid-air. Thou art the traitor-slaying stride of Vishnu. Mount the *Jagatī* metre; stride along the sky. Thou art the foeman-slaying stride of

Vishnu. Mount the Anushtubh metre. Stride along the quarters."

"Let me not with my foot offend thee, Vishnu; Agni, may I approach thy shade abounding in store of riches. Thou art Vishnu's mansion." (White Yajus, 2, 8. Compare Krishna Yajus 4, 2, 1.)

"Purusha hath a thousand heads, a thousand eyes, a thousand feet. Pervading the earth on every side, he fills a space of ten Angulas." (Sukla Yajus. 31, 1.)

From these passages and specially from White Yajus 2, 8, it is easy to perceive that by Vishnu's strides are meant the varying lengths of a gnomon's shadow measuring 24, 10 or 8 Angulas on the day of the Dakshināyana and 48 Angulas on the Uttarāyana in the month of Pushya. The expression "May I approach thy shadow" in White Yajus 2, 8, leaves no doubt that it is the shadow that is meant. A shadow of ten Angulas on earth, that is, on the day of the Dakshināyana is clearly a gnomon's shadow measured in another latitude, as clearly stated in the Kālalokaprakāśa quoted above.

Vishnu's Incarnations:—

It follows, therefore, that corresponding to the gradual increase of the gnomon's shadow from two Pādas or 24 Angulas at the commencement of the Dakshināyana to four Pādas or 48 Angulas on the day of the Uttarāyana, the metrical measure of the day of kindling of fire rises from Gāyatrī of 24 Angulas to 28 on the day of Tanūna-pāth fire, to 32 on the day of Narāśamsa fire, to 36 on the day of Barhis, to 40 on the day of Divine Doors, to 44 on the day of Day and Night, and to 48 on the day of the two Divine Hotri Priests. It follows therefore that the

seven occasions from that of Kindled Fire to that of the Divine Hotris are the seven months from Śrāvaṇa to Māgha of the same year or of different cyclic years characterized by their respective shadow-measures from Gāyatrī to Jagatī. Now it is easy to perceive that the seven measures are really the seven footprints of Vishnu and that among them prominence is given to the three footprints, Gāyatrī in the spring season, Trisṭubh in the windy or autumnal season and Jagatī in the winter season. It is also easy to perceive that the Puruṣa's or gnomon's shadow in the beginning of the rainy season at the close of the spring and summer is dwarfish and that it rises to its full height in winter. It, therefore, follows that the dwarf incarnation of Vishnu is no other than the dwarfish shadow of the gnomon called Puruṣa on the day of summer solstice. If this is so, as I think it is, it follows that the other nine incarnations of Vishnu are no more than forms of shadow cast by the gnomon on other occasions.

The fish incarnation of Vishnu is no other than the fish figure formed by the intersection of the two circles drawn round the gnomon with radius equal to the length of the shadow cast by the gnomon in the forenoon and afternoon in the spring season. The fish-figure thus formed is indeed called 'Matsya', a fish, in the Śulbasūtras of Āpastamba and other writers of the Śrautasūtras. The same fish figure takes the form of a tortoise, if it is rather bulged out than elongated. The same takes the form or is imagined to take the form of a boar at the close of the real spring season and at the commencement of the rainy season; for the raising of the earth from the waters means the demarkation of the spring from the

rainy season. Since the earth is called Hiranyakasipa its slaying by Narasimha means the shortening of the spring to give room to the rainy season arriving with its thunder like a lion's roar. The description of the arrival of a lioness in Śukla Yajus. 5, 12 implies the arrival of the rainy season at the close of the spring and summer; for the lioness is said there to have welcomed the Brāhmans and Nobles. Readers of the Vedas need not be told that in the Vedas Brāhman and Kshattriya are frequently used to mean the spring and the burning summer. In the Vedic passage "Brahmadrimha, Kshatram drimha" the words really mean the spring and the summer. The passage means—"make the spring firm and make the summer firm." It appears that originally the word Nārasimha meant a waterlion instead of a man-lion. The term "Nāra" in Nārāyaṇa is taken to mean water and Vishnu is said to have his abode in water or milk of the ocean. Vishnu is the god of both the summer solstice and the winter solstice. In summer solstice he is Nārāyaṇa, Nārasimha, Vāmana, Indra or Upendra. As a god of winter solstice he is Vāsudeva or god of Vasu, wealth or the constellation of Dhanishṭhā. In winter solstice he keeps his height, while in summer solstice he becomes dwarf. Likewise the other three incarnations of Vishnu. Jāmadagnya Rāma is the god of summer solstice. Jāmadagnya Rāma is the son of Jamadagni, kindled fire. He is said to have made a gift of the earth to Brāhmans exterminated the Kshatriyas twenty one times and reclaimed the earth from the ocean. This means that as a god of summer solstice, he drew a line of demarcation between the spring and summer, the seasons

the Brāhman and Kshatra, and also a line of demarkation between the spring and summer on the one hand and the rainy season called the ocean on the other hand. This means that by proper adjustment of the lunar year, the spring season of two months from Chaitra to the end of Vaiśākha and the summer of two months from Jyeshṭha to the end of Ashāḍha were given their proper places in the year. The reclaiming of the earth from the ocean means that by proper adjustment of the lunar year with the solar year, the four months of spring and summer were kept apart from the rainy season. The story of his slaying the Kshatriyas by moving round the earth twenty one times means that by adjusting the lunar with the solar year on twentyone intercalary periods, the spring, the season of the Brāhman, and the summer, the season of the Kshatriyas, were kept in their proper places in the year. If, for example, the lunar year is not adjusted with the solar year for five years, the beginning of the year on the first of Śrāvaṇa in the rainy season falls back by two months and the year begins not in the rainy season, but in the beginning of the summer season. If it is not adjusted for another five years, the beginning of the year falls back by four months and it begins on the first day of the spring season. Similarly, failure to adjust the lunar year with the solar year for about 25 years brings back the beginning of the year by ten months. That is, the rainy season which its plough, Sita, comes to arrive in the Asvina month, the time of vernal equinox. Hence Rāma, the god of summer solstice, has to cross the ocean and go to Lanka on the equator, behead the ten heads or recurring ten heads of Rāvaṇa, and recover

Sītā, the plough, after purifying her in the heat of early summer, and give her the legitimate place in the rainy season. The breaking of Rudra's bow by Rāma to win Sītā seems to refer to the shifting of the solstitial position from its usual place in the sky. According to the Tait. Ar. 1, 5, one end of the bow lay on the earth and the other on the sky. Here the earth means the end of the spring and summer at the close of the month of Ashāḍha and the sky means the beginning of the winter solstice in the month of Māgha. In other words, the semicircular path of the sun from the rainy season to the winter season changed its semicircular form owing to the commencement of the rainy season earlier by a month or so than before. The cutting of the five hundred and thousand heads of Ahi and Mahi Rāvaṇas by Sita, the wife of Rāma, as narrated in the Ānanda Rāmāyana, seems to refer to the adjustment of five hundred and thousand intercalary months in the course of about 2,500 years.

It is now necessary to have a clear notion of what the Vedic poets meant by "World." The two worlds are the two Ayanas, the Dakṣiṇāyana and the Uttarāyana. The Sata. Br. (12, 7, 3, 7) says "There are two Vedis (altar-grounds), two worlds in truth there are they say, the world of the gods, and the world of the fathers, one of the Vedis is in the North, and the other in the South, for the world of the Gods is in the North and the world of the fathers is in the South. By the Northern one he secures the world of the gods, by the Southern one the world of the fathers."

The following passage of the Tai. Br. (2, 10, 4, 3) makes the meaning of the worlds still clearer:—

दिवं मे यच्छ अन्तरिक्षं मे यच्छ पृथिवीं मे यच्छ पृथिवीं
मे यच्छ अन्तरिक्षं मे यच्छ दिवं मे यच्छ अह्ना प्रसारय राज्या
समच राज्या प्रसारय अह्ना समच.

"Give me the sky, give me the air, and give me the earth, give me the earth, give me the air, and give me sky, expand by the day and decrease by night, expand by night and decrease by day."

While in other passage the lengths of Vishnu's feet on the two Ayanas are stated, in this passage variation in the length of days and nights in the three worlds, that is, the three seasons of four months each, is clearly stated. From the Uttarāyana to the Dakṣiṇāyana the day increases in length, and the night decreases. From the Dakṣiṇāyana to the Uttarāyana, the night increases and the day decreases. Accordingly the earth means the two months from Śrāvana to the end of Bhādrapada; The air means, the two months from Āsvayuja to the end of Kārtika; the sky means the two months from Mārgaśīra to the end of Pushya; again in the descending order the sky means the two months from Māgha to the end of Phālguna; the air means the two months from Chaitra to the end of Vaiśākha; and the earth means the two months from Jyeshṭha to the end of Ashāḍha. In other words, the earth here means the four months of the rains from Jyeshṭha to the end of Bhādrapada; the air means the four months from Asvayuja to the end of Pushya; the sky means the four months from the end of Pushya or from the beginning of Māgha to the end of Vaiśākha. In the same way it should be noted that the six worlds are the six months of any one Ayana; and seven worlds are the six months of any one Ayana and

the intercalary month at the end of Pushya or at the end of Ashāḍha. As the characteristics of months and the seasons varied, the vedic poets assigned each month to a different sun, six months to six suns, and seven months to seven suns.

The one contrivance which the Vedic poets seem to have made use of to ascertain the Nāḍikas of day and night was the recitation of the Vedic Hymns. As in the Pancha-Siddhāntika of Varāhamihira (P. 82) a hundred Bṛiḥatī verses or 3,600 syllables are taken to measure a Nādikā or 24 minutes. The recitation of 6,000 Bṛiḥatī verses is taken to measure a day and night. According to the Nidāna Sūtra of the Sāmāveda (IX, 6) the shortest day measured only 12 Muhūrtas or 24 Nādikās. It says "In the Agnishtoma sacrifice the twelve Stotras or sets of verses chanted leave three Muhūrtas unmeasured." According to the Sūryapragnapti of the Jains the longest day measured 18 Muhūrtas, a phenomenon occurring only in latitude 40°. The gnomon's shadow-measure of 48 angulas in winter solstice is equally a feature of the same latitude.

The splitting up of the cycle of 33 years into ten minor cycles seems to have been resorted to not merely for the sake of easy adjustment and verification, but also to make them to correspond to the various sacrificial periods of every ordinary year. The poets seem to have been aware of the defective nature of their cycle of 33 years and therefore frequently convert it into 34 years and say that Prajāpathi, the year-god, is 34. Seventeen, which is half of 34, is also called Prajāpati. Vishṇu is also identified with Prajāpati and is spoken of as follows :—

चतुर्भिश्च चतुर्भिश्च द्वाभ्यां पञ्चभिरेव च ।

ह्यते च पुनर्द्वाभ्यां स मे विष्णुः प्रसीदतु ॥

“He who is called upon by four and four, by two, by five, and who is called upon again by two (on the whole 17 times)—may that Vishṇu be gracious to me.” What these five calls are in the course of 17 years ($4+4+2+5+2=17$) has been made clear in the Apri verses explained above.

The Era of the cycle of thirty-three years :—

This era is merely a chain of the Cycle of Thirty-three lunar years during which the lunar year comes back to its original starting point or the new year's day after revolving through all the twelve months of the year like the Moharam of the Mahamaḍans. In the second year, it falls back by 11 days, in the third year by 22 days, in the fourth year by 33 days and so on, and thus falling back by 363 days in 33 years it makes almost an additional year. In other words 33 lunar years are equal to 32 solar years; $33 \times 354 = 11,682 = 32 \times 365 = 11,680$ days. Each of the 33 years is called a god and the total number of the synodic gods is counted and recorded in the Śukla Yajurveda (33, 7) as 3,339.

The cycle of sixty years is a twelve-fold cycle of five years of the Vedāṅgajyautisha, a correct and reliable edition of which was published by the author in A.D. 1935. The five years are named in the Vedas as “Samvatsara, Parivatsara, Anuvatsara, Idvatsara and Idāvatsara. (Sukla Yaj. 27, 45 and Krishna Yaj. 5, 7, 2). The sixty years are called Prabhva, Vibhava and so on up to Akshaya, the sixtieth year. The Tait. Aranyaka mentions Prabhava and Akshaya and compares them to a big river made up of

small rivers and says that though the intercalary year is perceptible, the intercalary month (Adhisatva) is not perceptible, but only inferrible. (Tait. Ar. 1. 1). The Atharvaveda (12, 3, 41) speaks of the cycle as "sixty years." Aryabhaṭa, the celebrated astronomer of India, says in his "Āryabhaṭīya" (A.D. 497) that when he was 23 years old, the cycle of sixty years completed its sixtieth revolution. This means that by A.D. 497, there had elapsed 3,600 years in the Era and that it began in B.C. 3,100. Evidently, the Brahmakalpa Era stopped short of this Era by 174 years.

These two Eras, the Era of Brahmakalpa and the Era of the cycle of Sixty years are now blended in the Samakalpa or declaration of the date and the rite about to be performed and recited by every Brāhman day after day throughout India—

"In the Kalpa of Brahma, in the second half of the Svetavarāha Kalpa, in the Manvantara called Vaivasvata, in Kaliyuga, in the year (named) in the series of sixty years beginning with Prabhava, in the Northern or Southern Ayana, (as the case may be), in the season, (named), in the month, in the half (bright or dark) and on the Tithi, one is going to perform"

Thus, these three Eras began in B.C. 3,100 and were current till about the second or the third century A.D. Only the Eras of Brhmakalpa and the Cycle of sixty years are blended and continued in the name of Era of Kaliyuga even to the present day.

Having thus shown how the cycles of Brahmakalpa and Manvantarās as well as the cycles of 20 and 33 years are treated like Eras in the Purāṇas and Siddhāntas I now proceed to point out the primary significance of these cyclic numbers in the next chapter.

CHAPTER IV.

THE CYCLE OF ECLIPSES.

AS already pointed out in the second chapter, the Vedic poets knew how to determine a lunation before hand. At first they took a lunation to be equal to $29\frac{1}{2}$ days and adjusted the lunar with the solar year by intercalating one month in every 30 months, 8 months in $8 \times 30 = 240$ months or 20 years, and 12 months in $12 \times 30 = 360$ months = 30 years. According to Kātyāyana Śrauta Sūtra (P. 326) the followers of the Dākshāyaṇīya system of sacrifice performed only full moon and new moon sacrifices and regained the season in the course of 30 years.

The Satapatha Brāhmaṇa (XI. 1, 2, 10) describes the Dākshāyaṇīya sacrifice in some detail, as follows—

“One ought to perform full and new moon sacrifices during fifteen years. In these fifteen years there are 360 full moons and new moons and there are in a year 360 nights. It is the nights he thus gains. If he performs it for another fifteen years, the year itself is gained.”

The meaning of the above passages is this—

The difference between 30 lunar 30 solar years is $12 \times 30 = 360$ days. Thus by performing full and new moon sacrifices for 30 years, the sacrifice gains 360 days. In other words the lunar year falls behind the solar year by about 12 days per year and thus falling back by 360 days in the course of 30 years, it comes back to its original starting point agreeing with the starting point of solar or sidereal year.

As already shown, the eight intercalary months of 20 years' cycle are described as the eight sons of Aditi. But this cycle of 20 years with 8 intercalary months is found to be wide of the mark.

It was replaced by another Chakra or cycle with seven and a half intercalary months. In the cycle Aditi is said to have brought forth eight children. In course of time the eighth was not fully developed and was half born. It was called Mārtāṇḍa and kept aside, and only seven and half sons called seven sages, of whom three were born in pairs making six and the seventh was born single, were retained. This is evidently a cycle of nearly 20 years with $7\frac{1}{2}$ instead of 8 intercalary months. This is the cycle which is described in the Vedāṅgajyautisha. This was also found to be defective and corrected by making the number of children to be only seven. This cycle is called a wing of 1,000 days of Hamsa who is said in the Atharvaveda (10, 8, 8) to fly to the heavens with his wings stretched with 1,000 days each and having all the gods clinging to his breast. A. V. 10, 8, 7 says that one Chakra or cycle is of 1,000 syllables. In the Purushasūkta it is called a cycle of 1,000 eyes, heads and feet. Tait. Ar. says that the time of the three eclipses called Paṭara, Viklidha and Pinga is the time of the cycle of 1,000 days. It also says that the Earth contains 1,000 and the sky also contains 1,000. In Tait. Ar. 1, 6, 3 the same cycle is called a Drapsa and that Krishna of the Drapsa is said to come once in 20,000 days put on its two wings. Now 1,000 days are nearly equal to 33.86 lunations, or in round numbers 34. Hence 20,000 days are equal to $20,000 \times 34/12 = 56,666$ years and eight months. The Vedic Poets say that

each eclipse comes in three colours, once in black colour, once in red colour and finally in white colour. Accordingly dividing 56 years and 8 months by 3, we have 18 years, 10 months and 10 days as the period of recurrence of an eclipse of the same colour. It must be noted that the number of intercalary months is only seven in 19 years. Likewise let us take the case of Purusha or Rudra who is said to have 3,000 heads, eyes and feet. Doubling the number, we have 6,000 days, which is equal to $6,000 \times 34/12 = 17$ years. Prajāpati is frequently said to be 17. They say that the Vashaṭkāra formula which consists of the words "Āśrāvaya, Astu Śraushaṭ, Yaja, Yeyājamahe, and Vaushaṭ" contains 17 syllables and that *seventeen* is *Prajāpati*. From this it follows that the Vedic poets had three cycles in order, that is, 17 years, 19 years and 20 years, to enable them to rectify their errors.

In his "Indian Ephemeris," Vol. 1, P. 136, the late L. D. Swamikannu Pillai says regarding the cycles of eclipses as follows—

"The Metonic cycle can be applied to eclipses when the sun is very near a node at one of the eclipses compared. For example, on the 87th day of A.D. 1, (Table IV. L. first line) the distance of the sun from node was 3.41° . Nineteen years later the distance must have decreased by 7.57° , that is the distance then was 4.16° , at which distance an eclipse was still probable. We find from Table IV-L that on the 87th completed day of A.D. 20 there was a solar eclipse at which the sun's distance from node was 4.16° .

(a) 358 synodical months (Sūryasiddhānta)
 $= 10571.9504682$ dys.

(b) $30\frac{1}{2}$ joint revolutions of sun and node (Ephemeris)
 $=10571.909390$ days.

(c) 29 Indian sidereal years (Sūryasiddhānta)
 $=10592.503924$ days.

Difference between (a) and (c) $=20.6$ days.

Difference between (a) and (b) $=.041$ days.

or $.4258$.

This cycle of 29 years, less 20.6 days is the foundation of the next two cycles."

(a) 716 synodical months (Sūryasiddhānta) $=$
 21143.9009364 days.

(b) 61 joint revolutions of sun and node (Ephemeris)
 $=21143.818780$ days.

(c) 58 Indian sidereal years (Sūryasiddhānta) $=$
 21185.007848 days.

Difference between (a) and (c) $=41.107$ days.

Difference between (a) and (b) $=+.082156$ day
 or $-.08516^{\circ}$.

This cycle of 58 years less 41.1 days is the one most frequently used in Table IV—L.

That the cycle of 1,000 days and multiple of 1,000 days is well adapted to predict eclipses occurring in a cycle of 18 years and 11 days with opportunities to correct errors is clearly stated in the following extract from "Handbook of Astronomy" by Chambers, Vol. 2. Pages 464-467—

1. "That the 2,300 years' cycle is the primary natural cycle for the correction of the Metonic cycle, and that it may be considered as simply an expanded Metonic

cycle. Before Meton earned Athenian honours by discovering the celebrated 19 years cycle which bears his name, the prophet Daniel had embodied in his revealed chronology the grand cycle naturally adapted to correct the error of the Metonic cycle. The use of the 19 year cycle or 'golden number' is indispensable in a calendar adjusted to the months and years of nature. The slight error of that cycle (2h, 4m, 4s.) accumulates to nearly an entire day (22h, 44m) in eleven cycles or 209 years, and to nearly 11 days (10d, 10h) in 11×209 cycles or 2299 years, which error is balanced by 11 days epact in the 2300th year. The epact of any single year is 11 days, and the 11 days' excess of the lunar months above 2299 solar years, in 121 Metonic cycles, becomes the epact of the 2300th year. The 2300-year cycle which is 33 times more exact than the Metonic and is the primary cycle adapted to its correction is thus the natural secular basis for a calendar correctly adjusted to solar and lunar revolutions.

2. That the accumulated epacts of 2300 years or the difference between 2300 lunar years and the same number of solar make up exactly 70 lunar years and 7 months, a measure harmonious with the 7 months epact in the Metonic cycle and with the prevailing septiform character of the prophetic times. The rate of epact is remarkable as being *one month in 1000 days*. (992d); 12 months or a lunar year in 12,000 days (the 33 years' Messianic cycle) and 70 times this in 2,300 years.

3. That 2,300 years is not only a cycle of the solar and synodical month, as De Cheseaux discovered, but is also a cycle of the anomalistic lunar month. The

anomalistic month is 27.5546 days and 30,487 anomalistic months = 840,057.09 d; 28,447 synodical months = 840,056.67 d; 2,300 solar years = 850,057.09 d. Lunar cycles are contracted or enlarged in their various returns according to the moon's anomaly. The maximum difference is 9h, 47m. acceleration or retardation of the moon from this cause; together $19\frac{1}{2}$ hours. The 2,300 years being a cycle of the anomalistic month is free from this important error. The addition of this element to the other cyclical features in 2,300 years, makes it an unrivalled lunar cycle.

4. That the number 2,520 of which 1,260 is an evident fraction is the least common multiple of the first ten numbers. Twelve hundred and sixty years are 3½ times (each time being a period of 360 years) and are simply half the week of $(7/2)$ times or 2520 years. The arithmetical property of 2520 just mentioned gives rise to a large number of divisors and adapts it to the position which it holds as the measure of the many-jointed vertebral column, so to speak, of the prophetic times.

5. That the addition of 75 years to 1,260 years and thus to the whole "seven times" or 2,520 years which is made in the prophecies of Daniel is also made by natural solar and lunar revolutions. If any 2,520 lunar years and 2,520 solar years are taken as commencing at the same point, the former will terminate 75 solar years before the latter.

6. That the error of the 30 year cycle (the month of the prophetic times) is self-corrected in the "42 months" of prophecy or 1,260 years ($30 \times 42 = 1,260$). Thirty years is a cycle both in its lunar and solar forms. Adapting the prophetic times to both reckonings. 2,520

lunar years are a chain of 84 cycles of the latter; the one chain being 75 years longer than the other. Thirty lunar years constitute a very exact cycle of the month and day and indeed form the basis of the Mahamadan Calendar. If the lunar month be reckoned as 29d 12h 44m. (which is simply to omit 3 seconds), the cycle is absolutely exact. Thirty solar years on the other hand form a cycle of the solar year and the lunar month with an error of 1d, 10h, 2m. This error accumulates to a month in 360 years and therefore to 2 months in 1260 years which latter is a cycle of the month and year, a hundred times more accurate than the 30 years' cycle whose error it corrects.

7. That 2,300 years is exactly 40 days of the "Annus Magnus" of the revolution of the solar perigee with reference to the equinoxes. The stellar direction of the earth's elliptic orbit has a slow forward revolution completed in 109,800 years while the equinoxes sweep back in a contrary direction accomplishing their revolution in 25,870 years. The compound result is an advance of the solar perigee with reference to the equinoxes of one day in $57\frac{1}{2}$ years or 40 days in 2,300 years and 365 days or a complete revolution in nearly 21,000 years."

The cycle of thirty years observed by the Dākshāyāniya school of sacrificers has already been pointed out. The error of this cycle is also selfcorrected in 1260 years which is 42 times the cycle of 30 years. This idea is implied by 42 suns and 84 suns referred to in the Sūryapragnapti (XIX Prābhrita, P. 271) and also by the number of suns from 7 to 1,000 mentioned in the Tait. Aranyaka. The passage of the Sūryapragnapti is as follows:—

(१) ता कति णं चन्दिमसूरिया सव्वलोयं ओभासन्ति उज्जो वेति तवेति पभासेति य हि तेत्ति वदेज्जा? तत्थ खलु इमाणे दुवालसण्डिवतिओ पण्णत्ताओ. तत्थेगे एवमाहंसु. ता एके चन्दे एगे सूरु सव्वलोयं ओभासति उज्जोएत्ति तवेत्ति पभासेत्ति, एगे एवमाहंसु. एगे पुण एवमाहंसु. ता तिणिण चन्दा तिणिण सूरु सव्वलोयं ओभासेति.⁴

(२) एगे एवमाहंसु—ताआउट्ठं चन्दा ताआउट्ठं सूरु सव्वलोयं ओभासन्ति उज्जोवेति तवेति पगासन्ति.

(३) एगे एवमाहंसु—एतेणं अभिलावेणं णेतव्वम् । सत्त चिदा सत्तसूरा, दस चन्दा दस सूरु भारस चन्दा भारस सूरु वातालीसं चन्दा वातालीसं सूरु वावत्तरि चन्दा वावत्तरि सूरु वातालीसं चन्दसं वातालीसं सूरसतं वावत्तरि चन्दसयं वावत्तरि सूरसयं वातालीसं चन्दसहस्सं वातालीसं सूरसहस्सं वावत्तरं चन्दसहस्सं वावत्तरं सूरसहस्सं सव्वलोयं ओभासेति उज्जोवेति तवेति पगासन्ति.

"How many moons and how many suns light, heat and illuminate the whole world? What should be said about this? About this, there are twelve opinions: About this some say—

(1) That one moon and one sun light the whole world, heat it and illuminate it. Some others are of opinion—

(2) That three moons and three suns light, heat and illuminate the whole world. With the same repetition of words other opinions should be understood. Others say—

(3) that $3\frac{1}{2}$ moons and $3\frac{1}{2}$ suns light, heat and illuminate the whole world. Others say—

(4) that seven moons and seven suns light, heat and illuminate the whole world. Some others say—

⁴ Other three words as before.

- (5) that ten moons and ten suns,—
 - (6) twelve moons and twelve suns,—
 - (7) forty-two moons and forty-two suns,—
 - (8) seventy-two moons and seventy-two suns,—
 - (9) forty-two-hundred moons and forty-two-hundred suns,—
 - (10) seventy-two-hundred moons and seventy-two-hundred suns,—
 - (11) forty-two-thousand moons and forty-two-thousand suns,—
 - (12) seventy-two-thousand moons and seventy-two-thousand suns,—
- light, heat and illuminate the whole world."

From the above extract from Chamber's Astronomy and also from the reference made in the Sūryapragṇapti and the Tait. Āraṇyaka to 42, 82, or 7 to 1000 suns, and also from the mention made in the Tait. Āraṇyaka of the reappearances of Kṛishṇa once in 20,000 days, one can clearly perceive that the numbers 7 and 1,000 and their multiples are all connected with the 18 or 19 years' cycle of eclipses. "Seven suns" and "Prathamajas" are names of one cycle of eclipses in terms of seven intercalary months with seven different suns presiding over those months. Similarly "fourteen suns" or "fourteen moons" is a name of two cycles of eclipses equivalent to 36 or 38 years. Likewise twenty-one suns or cows is a name of three cycles of eclipses equivalent to 54 or 57 years, which is made to terminate in 60 years with opportunities for corrections and adjustment of the cycles.

We are not, however, left to guess or infer from the evidence of these and other cyclic numbers alone that there was a sacrificial cycle of eclipses in observance during the Vedic times. There are other records to show that these numbers are associated with cycles of eclipses.

In order to show that this is the real significance of the numbers, it is, however, necessary to know the exact nature of the conception which the Vedic poets had entertained about eclipses and the name or names which they gave to eclipses, lunar and solar. Speaking of a solar eclipse a Vedic poet says (Black Yajus. 2. 1. 2) as follows—

“Svarbhānu, the Asura, pierced the sun with darkness; the gods desired an atonement for him; the first darkness of his which they struck off became a black sheep; the second a bright-coloured one; the third a white one. What they cut off from the upper part of the bone became a barren ewe.”

From this we can understand that the first solar eclipse which the poets observed was of a black colour and that when that recurred in the second cycle it was of reddish colour; and that when it recurred for a third time, that is after 54 years and 33 days, it was dimly white; and that on the fortyfourth day after 72 years there was no trace of any eclipse and that the sun was in his usual bright splendour. Another thing to be noted in this connection is that one of the many names given to solar eclipses is “Avi, Sheep.” Again in B. Yj. 2. 1. 4 the poet speaks of a solar eclipse as follows:—

“Yonder sun did not shine; the gods desired an atonement for him; for him they offered this offering

ten bulls; verily thereby they restored his brilliance; For him who desires splendour he should offer this offering of ten bulls; verily he has recourse to yonder sun with his own share; verily he bestows on him splendour; he becomes resplendant. He should offer in the spring in the morning three with spots on the forehead; in the summer at midday; in the autumn in the afternoon three with white tails. Three are the brilliances of the sun, in the spring in the morning; in the summer at midday; in the autumn in the afternoon. Verily he wins whatever brilliances there are. They are offered in the course of the year. The year is the giver of splendour."

Evidently the offering of bulls in sets of three each in each of three seasons of the year is to make an atonement for the eclipses which occur in sets of three in the three seasons in a cycle of 18 years. In the three seasons of the cycle sometimes the solar eclipses amount to eleven, sometimes to ten and at other times to nine. The variation in number is due to other causes which it is unnecessary to discuss here. All that is to be noted in this connection is that bull or cow is another name given to a solar eclipse in addition to "Avi" or sheep which, as already pointed out, is given to it.

Similarly 'Goat' is the name given to a lunar eclipse. In Bl. Yaj. 2, 1, 1 a lunar eclipse is alluded to as follows:—

"He who desires cattle should offer one of a triplet to Soma and Pūshan; the she-goat has two teats; two are born together; the third for strength and growth; Verily he has recourse to Soma and Pūshan with their

own share; verily they produce cattle for him; Soma is the depositor of seed; Pūshan the producer of cattle."

Again in Bl. Yaj 6, 5, 10 the poets connect goats with Soma cups and sheep with Aditya cups. In the same passage it is said in defence of the drawing of Soma cups twice or thrice at a time as contrasted with the drawing of one Aditya cup at a time that "the female goat gives birth to two or three (at a time), but sheep are more numerous," alluding of course to the recurrence of more solar eclipses than lunar eclipses in a cycle, though lunar eclipses recur twice or thrice close to each other in the cycle of eclipses (*vide* A.D. 1901 and 1906 of "Chart of the Cycle.") In the most famous verse "Ajāmekām, Tait. Ar. 10, 10, which the Sāṅkhyas take as referring to Prakṛiti and Puruṣa, and the Vedāntins to Māya and two kinds of Jīvas, one addicted to, another aloof from, worldly pleasures, lunar and solar eclipses seem to be really referred to. The verses run as follows:—

अजामेकां लोहितशुक्लकृष्णां बह्वीं प्रजां जनयन्तीं सरूपाम् ।
अजो ह्येको जुषमाणोऽनुशेते जहात्येनां भुक्तभोगामजोऽन्यः ॥
हंसः शुचिसद्वसुरन्तरिक्षसद्भोता वेदिषदतिथिर्दुरोणसत् ।
नृषद्वरसद्वतसद्योमसदब्जा गोजा ऋतजा अद्रिजा ऋतं बृहत् ॥

One he-goat, desirous of enjoyment, lies near the she-goat who produces numerous offsprings of similar nature and possessed of red, white and black colours; another abandons her after complete enjoyment.

He is called Hamsa while in "Śuchi"; Vas while in the atmosphere; Hota while in the altar (earth); Atithi while in Duroṇa (his own house); Abjāh (flower)

of water) while among the people ; Gojāh (born of a cow) while among the nobles (royal people) ; Ritajāh (born of the Rita) while in the place of Rita ; Adrijāh (born of the mountain) while in the sky ; he is the Brihat Rita."

What are really referred to here, as in the whole of the Vedic literature, by the name Aja (masculine and feminine) are really the sun and the moon. The female is the sun, while the male goat is the moon. On the occasion of full moon, both look to each other lovingly as two lovers, but without union or without disfiguration after lunar eclipse ; on the occasion of the new moon, however, the sun (male) enjoys the moon (female) and abandons her.

In Tait. Ar. 3, 14 we are told that Prāṇa (the sun) abandons the just-born (the crescent), but never leaves out the decrepit one (the new moon) ; the sun not only sports with the moon when the latter is decrepit and lying, but also she never leaves him on the days close to his decrepitude ; Also Prāṇa (the sun) kindles the fire and is the father of the offspring, and as sacrifice he is Soma.

In the next Anuvāka of the Tait. Ar. a solar eclipse is described as the slaughter of a bull and the sun is asked to leave the winter solstice (Devayāna) and to go on his way to the other heaven (the Pitṛiyāna, the summer solstice) and the poet says that he has sacrificed for the death of one of the Prathamajās, a name given to the seven intercalary months of the eighteen years' cycle of eclipses.

In Bla. Yaj. 3, 4, 3 Vāyu is addressed to come with his thousand teams and a barren goat (barren on account of absence of a lunar eclipse at the commencement of a

fourth cycle of eclipses) is asked to become Manu and bring the divine host, as follows—

(a) "O! Vāyu, Drinker of the Pure, Come to us;

A *thousand* are thy teams, O! Thou that hast all choice boons; For thee the sweet drink hath been prepared, whereof, O! God, Thou hast the first drink;

(b) Thou, the fourth, art the barren, the eager one.

Since once in thought the embryo hath entered the womb do thou, the barren, go eagerly to the gods, be the desire of the sacrificer fulfilled.

(c) Thou art the goat, resting on wealth, sit on the earth, mount aloft on the atmosphere, in the sky be thy great radiance.

(d) Stretching the thread of the atmosphere do thou pursue the light; guard the paths of light made by prayer; Weave ye without a flaw the work of the singers: *Become Manu*, produce thou the *host divine*. Thou art the offering of mind."

It has already been pointed out how Krishna is expected to come back once in 20,000 days or 56 years and 8 months. Now 56 years and 8 months are equivalent to three cycles of eclipses. On the occasion of the prayer made by the poet in Bl. Yaj. 3, 4, 2 the expected lunar eclipse of black colour did not recur and the cycle counted in sets of thousand days proved a failure. In a cycle there are 71 or 72 eclipses forming a *Manu*. A Manvantara is a period of 71 or 72 Yugas or lunations with eclipses. In the present case the eclipse did not occur, as expected on the basis of the cycle of eclipses. This conclusively proves that the counting of time in sets of thousand days found in the Vedas, the references to

Manu, the sacrifice of *goats, sheep, cows or bulls*, and *horses* are all connected with the cycle of eclipses and that whenever a sacrifice is made, it may be taken for granted, it indicates the recurrence of an eclipse, solar or lunar, corresponding to the animal immolated.

The description of Purusha becoming the hymns of the R̥gveda, the Sāmāns of the Sāmaveda and the sacrificial formulas of the Yajurveda in the Purusha Sūkta is evidently a reference to the counting of the cycles of eclipses in terms of the hymns of the R̥gveda, the Sāmāns of the Sāmaveda and Yajus formulas of the Yajurveda. For example the Vashaṭkāra formula of 17 syllables indicates the expiration of 17 years in a cycle and Āpri hymn, 33 years. The number 31 counted in terms of eight Vasus, eleven Rudras and twelve Adityas seems to refer to the occurrence of 31 eclipses in the course of half a cycle of eclipses. The word Rudra is a name given to a solar eclipse with two lunar eclipses, preceding or following, or one preceding and another following the solar. Rudra is Phālāksha and Tryambaka, *i.e.*, a god with three eyes, of which one is fire, that is, a solar eclipse capable of reducing Kāma, the moon, to ashes. When eclipses are evidently deaths to gods, such as the moon and the sun, they must surely be death to men. Hence the Vedic poets thought that some atonement for the sin committed by them was necessary and they instituted the sacrifices to avoid Mṛtyu, death, and performed it on the occasions of eclipses.

In the Purushasūkta the number 1,000 in the head of Purusha is evidently a reference to the cycle of eclipses. The horses and animals are those of cyclic sacrifices.

The goats and sheep signify lunar and solar eclipses. The transformation of Purusha's face into a Brāhmaṇa means the beginning of the year in the spring season for the spring is taken as the symbol of Brāhmaṇa. It may also mean the sun, as he is represented as a learned god (Suryo vipaschit manasā punātu), an Achārya to the way-ward moon and to men, his offspring. The latter seems to be the meaning of the word Brāhmaṇa in the Sūkta, because the words, "Prabhrājamāna, Vṛishabha Lohitāksha found in the Sāvitri hymn recited day after day at noon by every Brāhmaṇa mean solar eclipses; and Brahma means the sun, and also the teacher in the word 'Brahmopadeśa' made to a Brāhmaṇa in his Upanayana rite. Likewise the two arms of Purusha, the time-gods represent the moon, for the moon is also called the king in the Vedas and the arm is spoken of as Rajanya. The two thighs represent the Maruts or the seven winds. The earthly representatives of the heavenly gods are of course the Brāhmaṇs, the kings and the trading people. The Śūdras are the earthly representatives of the labourers of the gods. His mind is the moon. Accordingly the word "Manas" in the Vedas means the moon. His nostrils represent seven winds each; his eye the sun; his mouth Agni and sometimes Indra also. His navel represents seven winds of the sky and his feet the earth (the summer solstice).

Usually there are 7 butter sacrifices (Pākayagnya) in the spring and 7 cooked rice offerings in the autumn. They seem to represent so many solar and lunar eclipses in those two seasons. In the head of Purusha there are seven or nine Prāṇas representing 9 lunar eclipses and three solar eclipses signified by Agni and Indra in the

mouth and his head (the winter solstice?) The nine lunar with three solar eclipses in the face of Purusha become three Rudras, each Rudra being made by one solar eclipse and two lunar eclipses. His two arms represent 14 lunar eclipses together. The seven Paridhis are seven circles of the celestial sphere, for Paridhi means an 'upasuryaka or Maṇḍala.'¹ The twenty one kindling sticks represent 21 solar eclipses with seven lunar; and the earth a solar eclipse (on the summer solstice?). On the whole there are 30 lunar eclipses and 32 solar eclipses in all.

According to expert astronomers there can be no more than 42 or 43 solar and 30 lunar eclipses in a cycle. Of these about six or eight may become invisible in one region of the globe and become visible in other latitudes. When such things happen, the poets wonder and pray to Varuṇa to maintain his Rīta or law. The Purusha hymn will again be considered in detail in connection with Chakras later on.

As the poets say that their Uttarāyaṇa from winter solstice to summer solstice consisted of the seven self-born months represented by the seven Ādityas or the seven intercalary months of the nineteen years of the cycle of eclipses, the other half of the year must necessarily consist only of 5 months. Accordingly their longest day and the shortest night must be as 7/12 and 5/12 respectively. In other words their day must be 14 hours long and their latitude 40° to which a day of 14 hours corresponds.

The Rudrasūkta furnishes abundant proof to say that Rudra signifies an eclipse. His 1,000 eyes, 1,000 arrows and 1,000 bows refer to the cycle of 1,000 days

¹ See Digram II.

which forms part of an eclipse cycle. His braided hair, his black neck, white throat, his dusky, brown, and ruddy colours signify various partial lunar eclipses. His cord or Yajnyopavīta and his unstrung bow represent the appearance of two bodies on the same line so as to be eclipsed and to be eclipsed. The followers of the Tantra cult say that "Bindudvayāntāre dandah śivarūpaḥ Maṇiprabhah,"² a line between two circular bodies is Śiva of gem-like hue. His drawing the bow in various forms symbolises the various forms of eclipses. His visibility even to cow-herds and women carrying water from tanks outside the villages implies the striking nature of Rudra eclipses occurring in the course of 30 days which all look at with wonder and fear. His creeping away signifies the slow disappearance of eclipses. As some lunar eclipses appear like smoke and dust in far off wilderness, he is called a hunter and pursuer of cattle running or driven away by thieves. As lunar and solar eclipses that have occurred one after another in the same region, he is called the lord of cattle of plants, for the moon is said to have been recovering from his periodical consumption by eating the plants. Hence Rudra is a great physician. As eclipses are compared to kidnapping of men and women by burglars and thieves, he, being a sharer of eclipses, is the lord of thieves. Mention of the word, 'Manu' in the Sūkta is a clear reference to eclipse cycles. His appearance ten times in each of the five regions signifies to four sets of Rudras or eleven Tryambakas and six Tryambakas more in the upper region.

² See the author's Theory of the Origin of the Devanāgarī Alphabet, I.A. 1905-6.

Both in the Mait. S. (2, 9, 1) and the Tait. Ar. (10, 1) Rudra is praised as 'Skanda,' the son of six mothers, as the 'elephant-faced god' born of two mothers, as 'Brahma' seated on a lotus, as 'Keśava' (possessed of braided hair) and 'Nārāyaṇa,' as 'King Soma,' as 'Vainateya,' as a 'Trader,' and as 'Fire.' He is also described as a ferry sailing on water, and as an assembly of ministers and as a chief of an assembly. Now like ordinary lunations, eclipses also are regarded as the main cause of fecundity in the world. Also eclipses are spoken of as the offspring of eclipses that preceded them, solar eclipses as daughters and lunar as sons. A glance over the Chart of all the eclipses from 1,840 A.D. to 1919 A.D. appended here, will show the probability of the lunar eclipse of April 1902 being regarded as the son of the six eclipses of the year of 1901.—Likewise, it seems likely that a partial lunar eclipse in the rainy season was looked upon as the son of the two preceding solar or lunar eclipses, for the crescent looks like one tusk of an elephant. It is also possible that a lunar eclipse at midnight was looked upon as a ferry sailing on a river or as a merchant sailing on, or two friends sailing in a ferry. If the sun or moon set eclipsed, the next day in the morning or in the evening the sun or moon might be spoken of as a deserter of his friend who sailed with him. A series of three or more eclipses in a year might possibly be spoken of as an assembly of ministers in consultation.

There are also many other things connected with eclipses. The seven musical notes, the drum, the circular bronze pieces to produce rhythm, and the art of writing also seem to have some connection with eclipses. These

are, however, questions too wide to be discussed here. Hence leaving them out, I next take up the list of eclipses given in the Tait. Āraṇyaka.

In the Tait Āraṇyaka the poet describes the year with an intercalary month as Adhisamvatsara and begins it with the rainy season. He describes also the signs and characteristics by which its arrival can be easily recognized. As the Āraṇyaka furnishes additional evidence about the cycle of eclipses, some of its passages bearing on the subject are quoted with translation and notes, wherever necessary, and without original passages where unnecessary. The Āraṇyaka begins as follows:—

आपमापामपस्सर्वा अस्मादस्मादितोऽमुतः ।
 अग्निर्वायुश्च सूर्यश्च सह सञ्चस्करर्धिया ॥
 वाय्वश्वा रश्मिपतयः मरीच्यात्मानो अद्रुहः ।
 देवीर्भुवनसूवरीः पुत्रवत्त्वाय मे सुत ।
 महानाग्निर्महामानाः महसो महसस्स्वः ॥
 देवीः पर्जन्यसूवरीः पुत्रवत्त्वाय मे सुत ।
 अपाश्च्युष्णिमपा रक्षः अपाश्च्युष्णिमपा रघम् ।
 अपाघ्नमप चावर्ति अप देवीरितो हित
 वज्रं देवीरजीतांश्च भुवनं देवसूवरीः ।
 आदित्यानदितिं देवीं योनिनोर्ध्वमुदीषत ।
 शिवा नः शन्तमा भवन्तु दिव्या आप ओषधयः
 सुमृडीका सरस्वति मा ते व्योम सन्दृशि ।

"I have obtained and obtained all waters from this and that side; may Agni, the sun, and the wind make the waters prosperous. (1)

"O! Waters, whose steeds are the seven winds, whose lords are the rays of the sun, whose body is formed

shining rays, who are not malicious to any one, and who are the mothers of all beings, allow me to *have sons*. (2)

"O! Waters, who are of pleasing names, who are worthy of worship, who are of shining form, who are productive of *food*, and who are the mothers of the raining clouds, allow me to *have sons*. (3)

"O! Waters, take away the excessive heat and fever, take away the demon, take away the bad smell, and take away our poverty. (4)

"O! Waters, hold up the thunderbolt, hold up life and all beings; O! mothers of gods, hold up the Adityas as well as the goddess Aditi together with her womb (*bringing forth the Ādityas or intercalary months*). (5)

"May the heavenly waters and herbs be auspicious to us, and may they bring happiness to us; O! water, thou art the bestower of comforts; I have not seen thy abode in the sky." (6)

In the next passages the poet proceeds to define the cycle and its characteristics:—

स्मृतिः प्रत्यक्षमैतिह्यमनुमानश्चतुष्टयं ।

एतैरादित्यमण्डलं सर्वैरेव विधास्यते ॥ 7

सूर्यो मरीचिमादत्ते सर्वस्माद्भुवनादधि ।

तस्याः पाकविशेषेण स्मृतं कालविशेषणं ॥ 8

नदीव प्रभावात्काचिदक्षय्यात्स्यंदते यथा ।

तां नद्योऽभिसमायन्ति सौरुस्सती न निवर्तते ॥ 9

एवं नानासमुत्थानाः कालास्संवत्सरं श्रिताः ।

अणुशश्च महशश्च सर्वे समवयन्ति तं ॥ 10

स तैस्सर्वैस्समाविष्टः उरुस्सन्न निवर्तते ।

अधिसंवत्सरं विद्यात् तदेवलक्षणे ॥ 11

अणुभिश्च महद्भिश्च समारूढः प्रदृश्यते ।
 संवत्सरः प्रत्यक्षेण नाधिसत्त्वः प्रदृश्यते ॥ 12
 पटरो विक्लिधः पिङ्गः एतद्वरुणलक्षणं ।
 यत्रैतदुपदृश्यते सहस्रं तत्र नीयते ॥ 13
 एकं हि शिरः नाना मुखे कृत्स्नं तद्वतुलक्षणं ।
 उभयतस्सप्तैन्द्रियाणि जल्पितं त्वेव दिह्यते ॥ 14
 शुक्लकृष्णे संवत्सरस्य दक्षिणचामयोः पार्श्वयोः ।

तस्यैषा भवति :—

शुक्रं तेऽन्यद्यजतं तेऽन्यत् ।
 विपुरुषे अहनी द्यौरिवासि ॥ 15
 विश्वा हि माया अवसि स्वधावः ।
 भद्रा ते पूषन्निव रातिरस्त्विति ॥ 16
 नात्र भुवना न पूषा न पशवः नादित्यः ।
 संवत्सर एव प्रत्यक्षेण प्रियतमं विद्यात् ॥ 17

एतद्वै संवत्सरस्य प्रियतमं रूपं योऽस्य महानर्थं उत्पत्स्यमानो भवति ।
 इदं पुण्यं कुरुष्वेति तमाहरणं दद्यात् ॥ 18

साकंजानां सप्तथमादुरेकजं षड्व्यमा ऋषयो देवजा इति ।
 तेषामिष्टानि विहितानि धामशः स्थात्रे रेजन्ते विकृतानि रूपशः इति ।
 को नु मर्या अमिथितः सखा सखायमब्रवीत् जहाको अस्मदीषत इति ।
 यस्तित्याज सखिविदं सखायं न तस्य वाच्यपि भागो अस्ति ।
 यदीं शृणोत्यलकं शृणोति । न हि प्रवेद सुकृतस्य पन्थामिति ॥

"Remembrance of past experience in records, seeing with the eyes, tales heard from others, and inference as the fourth,—with all these (*four kinds of evidence*), the circle of the (*seven or eight*) Adityas is laid up. (7)

"The Sun takes up the water from the whole world; by means of the peculiar and ripe form of the waters (*i.e.*, raining clouds) the characteristics of the time are remembered.

"Just as a river flows from an imperishable source, and just as other streamlets join her, and just as she, growing in volume, never returns, so the moments of various birth from Prabhava, the first year, to Akshaya, the last of the sixty years, are merged in the year, by small bits and big periods; they all form the year; being formed of them it grows in length and never returns.

"One should understand this as a year with intercalation of 7 months (Adhisamvatsara), and that by means of the characteristics (to be spoken of); formed of small and big bits of time, the ordinary year is visible to the eye; but not so the swollen thing (*i.e.*, the year in which intercalation is to be made.") (12)

The poet has defined the year as being formed of a number of small and big moments; and has pointed out the difficulty of seeing the intercalated year. Now he is going to describe those characteristics by which its arrival can be inferred:—

"Paṭara, Viklidha and Pinga—these (eclipses) are the characteristics of Varuṇa. When this is seen, then there is inserted 1000 (The cycle of 1000 days.).

One is the head; but faces are many; this is in brief the sum total of the characteristics of the seasons. Seven organs of sense on both sides; speech alone is to be added.

On the right and left sides of the year there are the white and dark portions. The following is said of it:—

"O! Year, thy white part is one thing; and thy worshipable part is another; of such different forms are thy days and nights; thou art like the sky; O! Food-productive year, various illusions thou keepest; O! Nurse of the world, may thy yield be good.

There is no world here; neither god Pūshan; nor cattle; nor Āditya; the year alone should with direct perception be regarded as the loveliest; this is what makes the year dear to all on account of its great yield in store for us for the purpose of performing a meritorious rite; one should return this gift.

They say that of the twins born together, the seventh is single born; the six alone are born twins, sages born from the gods; these have their stations formed for them; they vary in their nature for the good of the world.

O! Men, tell me whether there is a friend who, though not hurt and deserted by his friend says concerning the other that "deserting me, this friend runs away."

He who deserts a friend that knows the obligations of friendship is not worthy of being mentioned even by name; if one hears of him or hears of 'Im' sound, one hears of a false friend; for the deserter does not know the path of virtue.¹

ऋतुर्कतुना नुद्यमानः विननादामिधावः ।

षष्टिश्च त्रिंशका वल्गाः शुक्लकृष्णौ च षाष्टिकौ ॥

सारागवस्त्रैर्जरदक्षः वसन्तो वसुभिस्सह ।

संवत्सरस्य सवितुः प्रैषकृत्प्रथमः स्मृतः ॥

¹ This seems to refer to one of three successive or Tryambaka eclipses which becomes invisible. The symbol of 'i' letter in Brāhmī alphabet is three dots like a Tryambaka.

अमूनादयतेत्यन्यान् अमूंश्च परिरक्षतः ।
 एता वाचः प्रयुज्यन्ते यत्रैतदुपदृश्यते ॥
 एतदेव विजानीयात् प्रमाणं कालविपर्यये ।
 विशेषणं तु वक्ष्यामः ऋतूनां तन्निबोधत ॥
 शुक्लवासा रुद्रगणः ग्रीष्मेणावर्तते सह ।
 निजहन्पृथिवीं सर्वां ज्योतिषाऽप्रतिख्येन सः ।
 विश्वरूपाणि वासांसि आदित्यानां निबोधत ।
 संवत्सरीणं कर्मफलं वर्षाभिर्ददतां सह ।
 अदुःखो दुःखचक्षुरिव तन्नापीत इव दृश्यते ।
 शीतेनाव्यथयन्निव रुरुदक्ष इव दृश्यते ।
 ह्लादयते ज्वलतश्चैव शाम्यतश्चास्य चक्षुषी ।
 या वै प्रजा भ्रंश्यन्ते संवत्सरात्ता भ्रंश्यन्ते ॥
 याः प्रतितिष्ठन्ति संवत्सरे ताः प्रतितिष्ठन्ति ।
 वर्षाभ्य इत्यर्थः इति.

One season driven on by another coming behind it makes a noise : They are sixty-fold and thirty-fold ; the white and black parts are also sixty-fold.¹

The spring with the Vasus (Vasu-eclipses) clothed in reddish white garment is the first messenger; it is said, of the productive year. When the spring comes, these words are usually spoken and heard of:—"Feed these persons and protect those others."

One should know this characteristic of time: We are going to describe the distinct characteristics of the seasons: know them from us.

¹ This may mean thirty revolutions of sixty years. The white and black parts are the Northern and Southern Ayanas of the year. If this is so, it means that 1800 years were passed in the era of the cycle of 60 years.

16. The group of the Rudras (Rudra eclipses) wearing white garments comes always with the summer striking the earth with its dazzling hot splendour; the garments of the Ādityas who bring in to us the results of our work in the year are of various colours.

17. Though not unhappy, he is unhappy in having sore-eyes; it appears brown; its cold does not cause grief; it has plenty of deer; it pleases all with its shining plenty; its eyes are also cured; those who fall from work in this season fall from the year; those who stand in the year do really stand in the *rainy season*.

अक्षिदुःखोत्थितसेव विप्रसन्ने कनीनिके ।

आङ्के चाद्रणं नास्ति ऋभूणां तन्निबोधत ।

कनकाभानि वासांसि अहतानि निबोधत ।

अन्नमश्नीत मृज्मीत अहं वो जीवनप्रदः ।

एता वाचः प्रयुज्यन्ते शरद्यत्रोपदृश्यते ।

अभिधून्वन्तोऽभिघ्नन्त इव वातवन्तो मरुद्गणाः ।

अमुतो जेतुमिषुमुखमिव सन्नद्धास्सह ददृशे ह ।

अपध्वस्तैर्वस्तिवर्णैरिव विशिखासः कपर्दिनः

अक्रुद्धस्य योत्स्यमानस्य क्रुद्धस्येव लोहिनी ।

हेमतश्चक्षुषी विद्यात् अक्षणयोः क्षिपणोरिव ।

दुर्मिक्षं देवलोकेषु मनूनामुदकं गृहे ।

एताः वाचः वदन्तीः वैद्युतो यान्ति शैशिरीः ॥

ता अग्निः पवमाना अन्वैक्षत । इह जीविकामपरिपश्यन् ।
तस्यैषा भवति ।

इहे ह वः स्वतपसः मरुतः सूर्यत्वचः शर्म सुप्रथा आबृणे । इति

18. The pupils of the eyes are bright like those of a person who has recovered from sore-eyes; he applies

pigment to the eyes ; there is nothing in this season to cause sore-eyes ; this is said of the Ribhus (autumnal eclipses).

19. The garments are as yellow as gold and fresh ; the following words are usually spoken now : "eat plenty of food ; cleanse your edible things ; I am the bestower of food upon you ". These words are used when there arrives the *autumn*.

20. The groups of the windy *Maruts* shake and strike all things ; they appear, as it were, ready prepared for war to conquer others in battle with arrows ; they bear twisted hair in varying form and put on their dirty coats which are like sheep's bladder. They are not angry, though their eyes are red like those of an angry person.

21. There is draught in the world of gods ; water is plentyfull in the houses of men ; speaking the following words they spend the *winter-nights* with lightnings : Agni saw the plight of the people in not finding water on the way ; and requested the Maruts with the words : "O ! Maruts, Ye are powerful and shine like the sun ; I request that ye may bestow happiness on these people."

अतिताम्राणि वासांसि अष्टिवज्रशतघ्नि च ।

विश्वेदेवा विप्रहरन्ति अग्निजिह्वा असञ्चत ॥ 22

नैव देवो न मर्त्यः न राजा वरुणो विभुः ।

नाग्निर्नेन्द्रो न पवमानो मादृक् च न विद्यते ॥

दिव्यस्यैका धनुरार्लिः पृथिव्यामपराश्रिता ।

तस्यैन्द्रो वज्रिरूपेण धनुर्ज्यामच्छिनत्स्वयम् ।

तदिन्द्रधनुरित्यज्यं अभ्रवर्णेषु चक्षते ।

एतदेव शंयोर्बाह्वस्पत्यस्य एतदिन्द्रस्य धनुः ॥ 25

रुद्रस्येव धनुरास्तिः शिर उतिपपेश
 अत्यूर्ध्वक्षेऽतिरश्चात् शिशिरः प्रदृश्यते ।
 नैव रूपं न वासांसि न चक्षुः प्रतिदृश्यते ॥
 अन्योन्यं तु न हिंसातः सतस्तदेवलक्षणम् ।
 लोहितोऽक्षिण शारशीर्णिं सूर्यस्योदयनं प्रति ॥
 त्वं करोषि न्यंजलिकां त्वं करोषि निजानुकाम् ।
 निजानुका न्यंजलिका अमी वाचमुपासतामिति ॥ 29
 तस्मै सर्वे ऋतवो नमन्ते मर्यादाकरत्वात् ।
 प्रपुरोधां ब्राह्मण अश्नोति य एवं वेद ॥ 30
 स खलु संवत्सर एतैस्सेनानीभिस्सह
 इन्द्राय सर्वान्कामानभिवहति ।

22. Very red are the garments; there are the weapons called Ashti, Vajra and Śataghni; the All-gods strike their enemy and make a loud noise with their fiery tongues: "There is no god here; nor man; not even the powerful king Varuṇa; no Fire, no Indra, no Pavamāna; there is none like ourselves; there is one end of the bow in the sky; and the other end is on the earth; Indra disguised as Vamris (white ants) cut it into two pieces; this is the string-less bow of Indra; so say the people looking at the colours of the rainbow; this is the bow of Śamyu, the son of Bṛhaspati; this is the bow of Rudra; the broken end of the bow, when cut into two, carried off Rudra's own head; it became Pravargya; hence whoever performs a Pravargya sacrifice restores Rudra's head: Him Rudra does not injure; whoever knows this prospers.

23. There is seen the *winter*, in which man raises his eyes; no regard for beauty; nor for fine garments.

not even the eyes are turned to the mirror ; in this season men (even enemies) do not hurt each other ; this is the characteristic of *winter* (dewy season) running on its course ; eyes are red ; and the head has the colour of a parrot at this time when the sun turns on his *northward journey* ; " thou, doest fold thy hands in reverence ; thou bendest thy knees "—these words are obeyed even by young men ; to him all the seasons bow down ; because he fixes the functions of all men ; the Brāhman takes up his leadership as a chief priest ; whoever knows this prospers, the year with its troops of seasons (eclipses) brings in all desires to Indra ;

The Cycle of Eclipses :—

In the last chapter the cycle of 1,000 days borne on each of its two wings by the heavenly bird called Hamsa has been clearly explained. In that recurring cycle Aditi is said to give birth to $7\frac{1}{2}$ sons casting out the other half. Evidently it is a cycle of 20 years made up of 4 cycles of 5 years each. Now the Tait. Aranyaka introduces us to the same cycle in terms of days. It is called Drapsa. It is a cycle of 20,000 days.

स द्रप्सः । तस्यैषा भवति । अवद्रप्सोऽशुमतीमतिष्ठत् । इयानः
 रुष्णो दशमिस्सहस्रैः । प्रावर्तमिन्द्रशच्या धमन्तं । उपस्तुहि तं
 नृष्णामथद्रामिति । एतयैवेन्द्रः सालावृक्या सह असुरान्परिवृश्चति ।
 पृथिव्यंशुमती तामन्ववस्थितस्संवत्सरः दिवं च । नैवं विदुषा आचा-
 र्यन्तेवासिनौ अन्योन्यस्मै द्रुह्याताम् । यो द्रुह्यति भ्रश्यते स्वर्गा-
 लोकात् इत्युतुमण्डलानि । सूर्यमण्डलान्याख्यायिकाः अत ऊर्ध्वं
 सनिर्वचनाः.

It is the Drapsa; the following is said about it. The Drapsa has taken its stand on the one shining Amśumati. This Krishṇa has come by ten thousand (days). Thou art Indra. O! Thou, with thy might, melt the recurring, fuming and ever-remembered black one. Indra slays the Asura with the Sālāvriki. Anśumatī is the earth. The year has spread itself from the earth as far as the sky. The teacher and the student who know this should not hate each other. Whoever hates so will fall down from heaven. Thus are explained the circles of seasons. Now the Āditya-maṇḍalās and their stories will be explained."

Now it has been shown in the last chapter that a cycle of two thousand days is a cycle of $67\frac{1}{2}$ lunations. Hence 20,000 days are equal to 675 lunations or 56 years and 4 months. As already pointed out, the Vedic poets distinguished the recurrence of eclipses in three different colours, such as black, red and white in course of three cycles and the reappearance of the eclipse in its original colour in the fourth cycle. Hence if we divide 56 years and 4 months by 3, we get 18 years and nine months for one cycle of eclipses.

While describing the same *Drapsa*, the Atharva-veda (XVIII, 18, 28, 29) calls it 'hundred-streamed' and says as follows—

द्रप्सश्चस्कन्द पृथिवीमनुद्यासिमं च योनिमनु यश्च पूर्वः ।
समानं योनिमनुसञ्चरन्तं द्रप्सं जुहोम्यनुसप्त होत्राः ॥ 28

शतधारं वायुमर्कं स्वर्विदं नृचक्षसस्ते अमिचक्षते रयिम् ।
ये वृणन्ति प्रच यच्छन्ति सर्वदा ते द्रुहते दक्षिणां सप्तमातरम् ॥ 29

“The Drop leaped toward the earth, the sky, and toward both the sources, and the one that was of old. To the drop that goes about toward the same source, do I make oblations after the seven priests.

“A hundred-streamed Vāyu (wind), a heaven-finding sun, do those men beholders look upon; whoso bestow and present always, they milk a sacrificial gift having seven mothers.”

It is to be noted how the author of the Aranyaka connects the ‘drop’ with Indra, the god of the seventh intercalary month, and ten thousand days, while the Atharvaveda combines it with seven priests and mothers (*i.e.*, seven intercalary months) and one hundred streams. Now let us revert to the poet of the Aranyaka and hear what he says about the seven suns.

अरोगो भ्राजः पटरः पतङ्गः स्वर्णरो ज्योतिष्मान्विभासः ।
ते अस्मै सर्वे दिवमापतन्ति ऊर्जं दुहाना अनपस्फुरन्ति इति ॥
कश्यपोऽष्टमः स महामेरुं न जहाति ।

तस्यैषा भवति : —

यत्तं शिल्पं कश्यप रोचनावत् इंद्रियावत् पुष्कलं चित्रभानु ।
यस्मिन्सूर्या अर्पिताः सप्त साकम् ॥

तस्मिन्नाजानमधिविथ्रयेममिति । ते अस्मै सर्वे कश्यपाज्ज्यो-
तिर्लभन्ते । तान्सोमः कश्यपादधिनिधर्मति भस्त्राकर्मकृदिवैवम् ।
प्राणो जीवानि इंद्रियजीवानि । सप्तशीर्षण्याः प्राणाः सूर्या इत्याचार्याः ।
अपश्यमहमेतान्सप्तसूर्यानि पञ्चकर्णो वात्स्यायनः सप्तकर्णश्च प्लाक्षिः ॥

आनुश्रविक एव नौ कश्यप इति उभौ वेदयिते । न हि शेकुमिव
महामेरुं गंतुम् । अपश्यमहमेतत्सूर्यमण्डलं परिवर्तमानं-गार्ग्यः प्राण-
त्रातः । गच्छतं महामेरुम् । एकं चाजहतम् ।

भ्राजपटरपतङ्गा निहने तिष्ठन्नातपन्ति । तस्मादिह तन्त्रितमाः ।
 अमुत्रेतरे तस्मादिहातन्त्रितमाः । तेषामेषा भवति.
 सप्त सूर्या दिवमनुप्रविष्टाः तानन्वेति पथिभिर्दक्षिणावान् ।
 ते अस्मै सर्वे घृतमातपन्ति ऊर्जं दुहाना अनपस्फुरन्तः इति ॥

सप्तर्त्विजस्सूर्या इत्याचार्याः । तेषामेषा भवति । सप्तादशा नाना-
 सूर्याः सप्त होतार ऋत्विजः । देवा आदित्या ये सप्त तेभिस्सोमाभि-
 रक्षण इति,

तदप्याम्नायः । दिग्भ्राजः ऋतून्करोति । एतयैवावृता आसहस्र-
 सूर्यताया इति वैशंपायनः । तस्यैषा भवति.

यद्दद्याव इन्द्र ते शतं शतं भूमीः उतस्युः । न त्वा वज्रिन्
 सहस्रं सूर्याः अनु न जातमष्ट रोदसी इति ।

नाना लिङ्गात्वाद्दत्तानां नानासूर्यत्वमिति अष्टौ तु व्यवसिता इति.

"Aroga (one without disease), Bhrāja (shining),
 Paṭara (one covered with gray layers), Patanga (flying),
 Svarṇara (golden), Jyotishman (one with mass of light),
 and Vibhāsa (one with splendour),—these illumine the
 heavens for him, milking strength (for the sacrificer) and
 never losing their splendour. Kaśyapa is the eighth;
 he never leaves the mountain called the great Meru
 (Pole). The following is said of him:—

"What contrivance of thine, O! Kaśyapa, is that
 which is full of shining, vigorous, splendid, and of
 wondrous light, and in which the seven suns are set
 together."—

"In him (Kaśyapa) may we seek a king; they all
 (the suns) obtain light from him; the moon blows them
 out from Kaśyapa, just like a goldsmith blowing his
 bellows (over the fire with gold)."

"(The seven suns are) the vital breaths; they are the forces of life; they are the principles of the vital breaths; the seven vital breaths in the head are the suns,—so say the Teachers; Panchakarna, the son of Vātsyāyana says :

"I have seen the seven suns;" so also Saptakarna, the son of Plākshi."

"We have only heard of Kaśyapa; thus both of them tell each other; we cannot go to the great Meru. Gārgya Prāṇatrāta says: "I have seen the circle of the (seven) suns which are moving around; go to the great Meru and also to the one (Sun) who never leaves it."—"

"Bhrāja, Paṭara, and Patanga shine, standing below; hence they are productive of heat to this world; of them, the following is said"—

"The seven suns have entered into the heavenly world; whoever has paid sacrificial fees will follow them; they all illumine the *gṛhi* for him, milking strength and causing no heat.

"—'The seven sacrificial priests are the suns, '—so say the Teachers; of them, the following is said: 'The seven regions with many suns, the seven Hotri Priests, and the shining Adityas who are also seven; by means of them the moon is maintained (*i.e.*, the lunar year is prevented from rotating further)."

"—'Accordingly there is the saying: (the sun called) Digbhrāja (illuminator of the regions) makes the seasons; in this way the suns are multiplied up to a thousand,—so says Vaiśampāyana. About this, the following is said:—"

"O! Indra, if the number of both heaven and earth comes to a hundred, even then, O! Wielder of the thunderbolt, no thousand suns will follow thee, born as thou art between those two worlds. For the seasons are of different signs, the suns are many; but it is settled that they are eight."

What are called heaven and earth in this and other passages are the two limits between which the seven intercalary months are inserted, so as to bring both the lunar and solar years to the same starting point.

34. "But that they are only eight, is once for all fixed. There are eight spaheres of the suns above. This is said of them—

35. The Varied troops of the gods went up, the troops that are the eyes of Mitra, Varuṇa and Agni; these troops have pervaded the three worlds, the sky, the earth and the air. The sun is the life and soul of the moveable and immoveable worlds."

After mentioning the names of seven suns with seven solar eclipses, viz., "Aroga, Bhrāja, Paṭara, Patanga, Svarṇara, jyotishmat and Vibhāsa which belong to the air, or sky, the Araṇyaka names the eight solar eclipses in the eight quarters of the compass colled eight Vasus as:—

1. Agni,
2. Jātavedas,
3. Sahojas,
4. Achirāprabha,
5. Vaiśvānara,

6. Naryāpas,
7. पंक्तिराधस्
and
8. Visarpin, (located
on earth.)

Then 11 lunar and solar eclipses occurring in the middle region are of the same names and they are:—

- | | |
|--------------------------------|--------------------------|
| 1. Prabhrājamāna, ⁹ | 7. Śyāma, ¹⁴ |
| 2. Vyavadāta, ¹⁰ | 8. Kapila, ¹⁵ |
| 3. Vāsuki, | 9. Atilohita, |
| 4. Vaidyuta, ¹¹ | 10. Ūrdhva, |
| 5. Rājata, ¹² | 11. Avapatanta. |
| 6. Parusha, ¹³ | |

Then the eleven solar eclipses, (of which the first seven are also the names of the seven lunar eclipses occurring on each of the two sides of Purusha or the celestial circle of 7000 days) are named as follows—

- | | |
|------------------------|----------------------------|
| 1. Svāna, ¹ | 7. Kriśānu, ³ |
| 2. Bhrāt, ² | 8. Viśvāvasu, ⁴ |
| 3. Anghāri, | 9. Mūrdhanvān, |
| 4. Bambhāri, | 10. Sūryavarchas, |
| 5. Hasta, | 11. Kṛiti. |
| 6. Suhasta, | |

These are Nīlakanṭhas, (Garagirah), Blacknecks, swallows of poison.

Then the seven lunar eclipses of the atmospheric region are named as follows:—

- | | |
|------------------------------|---|
| 1. Varāhu, ⁵ | 5. Svāpi, ⁸ |
| 2. Svatapas, ⁶ | 6. Gṛihamedhas, ⁹ |
| 3. Vidyunmahas, ⁷ | 7. Asimividviṭ. (These in
the sky also). |
| 4. Dhūpi, | |

1 and 2 frequently mentioned in the Rigveda. 3 Rigveda I. 57, 5. 6 Rigveda III. 96, 1. 7 Rigveda I. 40, 3. 9 Rigveda VII. 63, 3. 10 Rigveda X. 117, 7. 11 Rigveda V, 105, 10. 12 Rigveda X. 13, 5. 13 Rigveda X. 53, 1. 14 Rigveda X. 128, 3. 15 Rigveda X. 27, 16

1 Rigveda I. 104, 1. 2 X. 125, 2. 3 IV. 27, 3. 4 X. 139, 5. 5 I. 121, 11. 6 I. 64, 7. 7 V. 54, 3. 8 IV. 41, 7.

Then three eclipses (solar?), one on the summer solstice called Sarama, one in the middle of the year called Agni, and one on the winter solstice called Brihaspati are mentioned.

It is probable that the two solstices are also named as 'Ahas' day and 'Rātri', night, and also as the two Aśvins.

As the poets believed that the earth and the sky (the summer and winter solstices) do not move from their places as fast as the sun and moon, they seem to have given them two asses to drag their chariot. The asses are idle and do not move fast from their places even in the face of danger. Then the Tait. Ar. (1, 10) describes in obscure and yet vivid terms a complete solar eclipse as follows—

सवितारं वितन्वन्तं अनुबध्नाति शम्बरः ।
 आपपूरु षम्बरश्चैव सविताऽरेपसो भवत् ।
 त्वं सुतृप्तं विदित्वैव बहुसोमगिरं वशी ।
 अन्वेति तुग्रो वक्रियां तं । अयसूयान्तसोमतृप्सुषु ।
 स सङ्ग्रामः तमोद्यः अत्योतः ।

वाचो गाः पिपाति तत् । स तद्गोभिः स्तवाऽत्येत्यन्ये । रक्षसाऽनन्विताश्च ये ।

.....
 अमी य ऋक्षा निहितास उच्चा । नक्तं ददृश्रे कुह चिद्विद्युः ।
 अदब्धानि वरुणस्य व्रतानि । विचाकशच्चन्द्रमा नक्षत्रमेति इति ।

अपागूहत सविता तृभीन् सर्वान्दिवो अन्धसः ।
 नक्तं तान्यभवन्दृशे । अस्थ्यस्थ्वा सम्भविष्यामः ।

“Just as a niggardly person holds fast to his wealth even at the time of his death, so the solstices or East and West points (Aśvinā) carried the sun in a secure boat across the celestial ocean. They carried him thus for three days and nights of the three previous cycles marked with the eclipse called Patanga, in three chariots in all, each marked with a hundred camping places, and in all with six horses (two asses for each of the 3 chariots of hundred Padas each). Śambara pursued the sun thus driven and fully drunk with Soma. A battle ensued with horses and in thick darkness. Prayers like cows went to rescue the Patanga as usual.¹ These eclipses between the two regions are periodical and the offsprings of those that preceded them. In the first cycle the Earth brings forth Day and the sky the Night; these latter become a couple; in the second cycle (or the first cycle, if the day and night are not eclipses) they bring forth an eclipse called Āditya of white-colour and Agni of reddish colour’

In the third (2nd?) round, the couple, Aditya and Agni, bring fourth two eclipses called Vritra and Vaidyuta respectively. In the fourth (3rd?) cycle Vritra and Vaidyuta bring forth two other eclipses called Ūshma and Nīhāra respectively. Now in this recurrence of the sun’s eclipses with black horses the Seven Bears kept so high, which usually appear at night and vanish at daytime in obedience to the law of Varuṇa, and also the moon going through the constellations, all these, when just now the sun withdrew his rays of light and when all the upper regions became dark, came in sight

¹ (Vāk, speech, is addressed to Patanga, Rigveda X. 180, 1 B.Y. I. 5, 3).

as in night. Now about the name and gender of the offspring born. Neuter, masculine or feminine? Immovable or movable? "I (says the poet) sacrifice, I did sacrifice, and I shall sacrifice." The offspring is really female; yet they call it male; (for the name is Patanga, male). The ancients considered all these? they made the formula of eclipses and kept it in their memory. (We have to follow). Who knows this celestial tree which has its root in the sky and its branches spread below? Who will believe this?"

Then the poet proceeds to distinguish between lunations with eclipses and ordinary lunations without eclipses. The former he compares to the pleasure caused by music and musical instruments (हसितं रुदितं गीतं वीणा पणवलासितम्), the latter to the quiet pleasure felt in secret pairing. Whenever there is laughter, or crying (as in the case of kidnaping or outrages) or lute-playing, it is pleasure with disturbance. Likewise in the pleasure caused by drumming or dancing the pleasure is accompanied with disturbance. Pleasure felt in secret pairing is commendable pleasure. Now ordinary lunations are the pairing of the sun and the moon with no sound. But in eclipses there is disturbance, as either laughter or music¹ indicative of the emotion of men and women violating marriage law. Crying is an indisputable evidence of violence. Vāsishṭha Rauhīṇeya is said to have affirmed that in such forced or faithless coupling as eclipses, there is either music or crying like that of a cow in rut, or of thunder, ("Vāsreva vidyut," Tait. Ar. 10, 12, 5.) Then the Āraṇyaka refers

¹ Music of the Gandharvas to captivate Gayatri (sun) Soma, the moon.

to a sage who devised the geometrical figure of the cycle of eclipses and commending secret pairing called the Sambhava rite, it praises the chariot of Agni (on the earth.)

In 1, 12 the *Āraṇyaka* addresses Indra and invites him to impregnate the *Āditya* with the seeds of *Chandra*. It then says that the seed has entered the sun resulting in the birth of "Varada Agni, a form of Rudra." Then it refers to the number of such Rudras and calls Indra to come with horses of peacock colour making *Mandra* (deep) sound and bearing 1,000. Then mentioning such transgressions of Indra as his Soma-drinking by force, and his seduction of Gotama's wife called *Ahalyā*, it refers to the departure of the eleven Rudras of red colour and of the atmospheric region and the arrival of the eight red Vasus of equatorial (earth) region (already enumerated) and invites *Bṛihaspati* and *Savitar* to come through their path in the atmospheric or water region. Then it goes to speak of the 8 or 7 sons of *Aditi*, the seven intercalary months of the cycle of eclipses, their departure and return, making *Yugas*, and names them as :

1. *Mitra*, 2. *Varuṇa*, 3. *Dhāta*, 4. *Aryama*, 5. *Amaśa*, 6. *Bhaga*, and 7. *Indra*.

Evidently the 19 or 18 years of the cycle of eclipses is divided into 7 parts, and the parts are named as *Mitra*, *Varuna* and so on. Accordingly the cycle is called *Saptapurusha*, container of seven *purushas* (7000 days) to impregnate the year, and the seed is called *Prājapatya*, *Prajāpati* being the moon and the mother being the sun, (*Sāvitrī*)

Then in 1, 15, the *Aranyaka* mentions the eclipses in the 8 (rather seven it ought to be) divisions as follows :

(i) "Let me shine in my own light in the region of the 8 Vasus."

(ii) "Let me shine in my own light in the region of the 11 Rudras."

(iii) "Let me shine in my own light in the region of the 12 Adityas."

(iv) "Let me shine in the region of the Satya Adityas."

(v) "Let me shine in my own light in the region of the three times seven Maruts called Abhidhūnvan, Abhighnan and Vāta."

(vi) "Let me shine in my own light in the region of the Ribhus."

(vii) "Let me shine in my own light in the region of the Viśve-Devas."

(viii) "Let me shine in the year (the cycle) that has returned."

Classified in this way the solar and lunar eclipses with their names can be tabulated as follows:—

- 8 Vasus,
- 11 Rudras,
- 12 Adityas,
- 2 (Satya and Rita Adityas of the Arctic Circle.),
- 27 Maruts,
- 4 Ribhus,
- 4 Visvedevas.

LIST OF ECLIPSES IN A CYCLE ACCORDING TO THE TAIT. AR. 1.

No.	EARTH		AIR		SKY	
	Spring Vasanta	Summer Grishma	Rains Varsha	Autumn Śarad	Snowy Hemanta	Dewy Śisira
1	Agni	Prabhrajāmāna	Svāna	Varāhu	Aroga	Bṛhaspati
2	Jātavedas	Vyavādāta	Bhrāt	Svatapas	Bhṛaja	Rudra
3	Sahojas	Vāsuki	Anghāri	Vidyurmahas	Paṭara	Sarama
4	Achirāprabha	Vaidyuta	Bambhāri	Dhūpi	Patanga	Ahah
5	Vaiśvānara	Rājata	Hasta	Svapi	Svarṇara	Ratri
6	Naryāpas	Parusha	Suhasta	Grihamedhas	Jyotishman	Agni
7	Panktirādhās	Śyāma	Kriśānu	Asimividvit	Vibhasa	Āditya
8	Visarpi	Kapila	Viśvavasu	The four Ribhus	The seven Adityas bringing with them the years' produce	Vṛitra

No.	EARTH		AIR		SKY	
	Spring Vasanta	Summer Grishma	Rains Varsha	Autumn Śarad	Snowy Hemanta	Dewy Śisira
9	...	Atilohita	Mūrdhanvan	...	...	Vaidyuta
10	...	Ūrdhva	Sūryavarchas	...	...	Ūshman
11	...	Anavapatanta	Kṛiti	...	...	Nīhara
	These are Kṣhitiवासु while Aroga, etc., are Antariksha-वासु	...	These are Nīlakanthas	Once on earth and once in air. These are Kapardins	...	These are Visvedevas
Total	8	11	11	(7 with 4 Ribhus); (7 on earth & 7 on air with 4 Ribhus) 11	7 or 8 with Kāsyapa in the Pole	11

$$8+11+11+11+7+7+11=66$$

With Indra and Kṛishna at war with each other once in 20,000 days.

This number various, as it ought to, on account of the invisibility of some eclipses in the latitude of the Vedic poets.

It must be noted that Vasu is wealth. Golden or silver ornaments of women are also Vasus, because they are the wealth of women. They go by the name "Nidhi" when kept in safe custody for use in time of distress. According to the Amarakośa the Nidhis, nine in number, are (1) Mahāpadma, a big lotus flower of gold, (2) Padma, a small lotus flower, (3) Śankha, a triangular golden ornament like a Conch, (4) Makara, an ornament like an alligator in shape, (5) Kachhapa, an ornament like a tortoise in form, (6) Mukunda, a ruby, (7) Kunda, an yellow or green gem, (8) Nīla, a blue stone, (9) Vara, a diamond. Even now ornaments of the above type are worn by Hindu women. It is likely, therefore, that the Vasu-eclipses are so called on account of their resemblance to the golden ornaments with or without gems inlaid in them.

Groups of three eclipses, solar and lunar, are called Rudras or Tryambakas, gods with three eyes, if close to each other; if far from each other, they are called Dīrghalochanas, or Dhurilochanas. The latter words are names given to Viśvedevas, eclipses of the winter season. Rudras appear only in summer with rains or in the rainy season. Of the three eclipses forming a Rudra-eclipse the disappearance of one seems to have been spoken of "as a friend deserting his friend" in the beginning of the Aranyaka. In the Brāhmi alphabet three dots placed in triangular corners represent the "I" sound. When there are only two dots owing to the disappearance of the third dot (eclipse), it does not represent "I" sound. In the altar eight bricks represent the Vasus and eleven bricks the Rudras.¹

¹ See the Author's "A theory of the origin of the Devanāgarī Alphabet." in I. A. 1905-6.

In A. V. 10, 8, 9 we are told that there is a gourd of Soma-liquor called Yaśas with its bottom turned upwards and that the seven Sages (the Great Bear or the seven Suns of the seven intercalary months of the cycle of eclipses?) are said to be guarding it. In A. V. 12, 3, 41 we are told that a guardian diety (Nidhipa) is coveting the treasure for himself once in 60 years. Since cattle are also called wealth, I think that the Gopas of A. V. 10, 8, 9 are the same as the Nidhipas of A. V. 12, 3, 41. Anyhow the seven suns presiding over the eight or 7 intercalary months of the eclipse cycle which is called in the Tait. Ar. At̥tāra or Ashtāchakra are the guardian dieties of Vasu, wealth, for Vasu-eclipses occur in the cycle. The word At̥tāra or Asāthchakra is a name given to the 20 years' cycle with eight intercalary months presided over by eight suns or Adityas meaning sons of Aditi. According to the Vedic poets a Parva or half a lunation consisted of $14\frac{3}{4}$ days and a lunation $29\frac{1}{2}$ days. The fractions such as $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, and $\frac{4}{4}$ after fourteen days of a Parva were called Ekapāth, Dvipāth, Tripāth and Chatushpāth. As the Vedic poets used to count days in terms of syllables of a verse, assigning one syllable to one day, the first three fractions equivalent to one-fourth, two-fourths, three-fourths of a syllable standing for similar divisions of a day, they rightly regarded as inexpressible and only four-fourths which is equivalent to one day and one syllable as expressible. This is clearly stated in the following hymn (A. V. 7, 10, 27.)—

चत्वारि वाक्परिमिता पदानि तानि विदुर्ब्राह्मणा ये मनीषिणः ।
गुहा त्रीणि निहिता नेङ्गयन्ति चतुर्थं वाचो मनुष्या वदन्ति ॥

"Four are the divisions measurable by a syllable and its parts. Those Brāhmans who are wise know them. Of them three divisions are kept in the cave, and are not utterable; only the fourth division men express."

In other words one-fourth, two-fourths, and three-fourths measuring similar divisions of a day are inexpressible, and only four-fourths equivalent to a complete day is what can be uttered. As already pointed out, Kali, Dvāpara, Tretā, and Kṛita were originally the names of Parvas ending in one-fourth, two-fourths, three-fourths, and four-fourths of a day. Five hundred such Parvas or seven thousand days in round number constituted a cycle of eight intercalary months and seventy-one or seventy-two eclipses as a rule. In course of time the eight intercalary months were reduced first to seven and a half (saptārdhagarbhā Aditih), and then to seven months called seven Manus, the years of the cycle being at the same time reduced to 19, as already shown above. In the Amarakośa 1000 Yugas or Parvas are stated to constitute a day or night Kalpa of Brahma and are split into fourteen Manu-periods or Manvantaras of seventyone Yugas or Parvas each. Thus it is clear that Manu is a name given to seventyone or seventytwo Parvas with eclipses. It is not a word found only in the Amara and classical literature. It is also frequently met in the Vedas, undoubtedly in the above sense, when used in connection with eclipses.

Punning on the words "Dvipāth" and "Chatushpāth," the Vedic poets call lunations ending in half a day bi-peds or birds and men; and lunations ending with a complete day cattle or, cows and other quadrupeds. Whenever the poets speak of Indra letting out cows

hidden in caves, we have to understand them to mean that the lunation with Krishna eclipse is a complete Parva and that the eclipse is got rid of with the aid of Indra. It is also called an Ukthya or expressible day. Ukthya is also used in the sense of 15. The same idea is expressed in the following famous verse of number-puzzles, which later commentators have variously interpreted in vain.

चत्वारि शृङ्गाख्योऽस्य पादा द्वेशीर्षे सप्त हस्तासो अस्य ।
त्रिधा बद्धो वृषभो रोरवीति महो देवो मर्त्यान् आविवेश ॥

"Four are the horns ; three are the quarter divisions ; two are the heads ; seven are the hands ; bound in three ways the bull bellows ; the great god has entered into men."

Here the four horns are the four fractions in which Parvas end and of which one is complete being four-fourths or Chatuspāth ; hence there are only three Pādas or quarters, namely, one-fourth, two fourths, and three-fourths. The two heads are the two Parvas which end in a complete day and between which Parvas ending with fractions of a day come. The seven hands are the seven intercalary months due to these fractions in the course of 19 or 20 luni-solar years. The cycle is bound in three ways, that is, three cycles of 20 years each, making a great cycle of 60 years.



CHART OF ECLIPSES FROM 1840-1920

	Vaiśākha	Jyeshtha	Aśāḍha	Śrāvaṇa	Bhādrapada	Āśvina	Kārtika	Mārgaśīra		Pushya	Māgha	Palmāṇa	Chaitra
1840	.....	.....	.....	Ag. 12	Ag. 27	.....	.....	.....	1840	.....	Feb 17	Mr. 3	.....
1841	.....	.....	.....	Ag. 2	.....	.....	.....	.....	41	.....	Feb. 6	.....	.....
1842	.....	.....	Jly. 7 & 22	.....	.....	.....	.....	.....	42	Jan. 26	.....	.....	.....
1843	.....	.....	.....	.....	.....	.....	.....	D 6	43	.....	.....	.....	.....
1844	.....	My. 31	.....	.....	.....	.....	N 25	.....	44	D. 21	.....	.....	.....
1845	My 6 & 21	.....	.....	.....	.....	.....	N 15	.....	45	.....	.....	.....	.....
1846	.....	.....	.....	.....	.....	.....	Oct. 20	.....	46	.....	.....	.....	.....
1847	Ap. 15	.....	.....	.....	Sep. 24	Oct. 9	.....	.....	47	.....	.....	Mr. 31	.....
									48	.....	.....	Mr. 19	.....

	Vaiśākha	Jyeshtha	Ashāḍha	Śrāvana	Bhādrapada	Āṣvina	Kārtika	Mārgaśīra		Pushya	Māgha	Palguna	Chaitra
1848	.....	.....	.....	.....	Se 13, 27 ○ ●	.....	.....	.....	49	.....	.....	Fe 22 M. 8 ● ○	.....
1849	.....	.....	.....	.....	Ag 18 Se 2 ● ○	.....	.....	.....	50	.....	.....	Feb. 11 ●	.....
1850	.....	.....	.....	.....	.....	.....	.....	.....	51	Jan. 17 ○	.....	.....	.....
1851	.....	.....	Jly. 13 ○	.....	.....	.....	.....	.....	52	Jan. 6 ○	.....	.....	.....
1852	.....	.....	Jly. 1 ○	.....	.....	.....	.....	D. 11 & 26 ● ○	53	.....	.....	.....	.....
1853	.....	Jun. 21 ○	.....	.....	.....	.....	.....	.....	54	.....	.....	.....	.....
1854	My. 12 ○	.....	.....	.....	.....	.....	Nov. 5 ○	.....	55	.....	.....	.....	.....
1855	My 1 & 16 ○ ●	.....	.....	.....	.....	Oct. 25 ○	.....	.....	56	.....	.....	Ap. 5 & 19 ● ○	.....
1856	.....	.....	.....	.....	Sep. 29 ●	Oct. 13 ○	.....	.....	57	.....	.....	.....	.....

CHART OF ECLIPSES FROM 1840-1920

[illegible]

	Vaisākha	Jyeshtha	Ashādha	Śrāvana	Bhādrapada	Āśvina	Kārtika	Mārgasīra		Pushya	Māgha	Phalguṇa	Chaitra
1869	.....	.....	Jly. 23 ○	.....	.....	.....	.....	.....	70	Jan 17 ○	.....	.....	.....
1870	.....	.....	Jly. 13 ○	.....	.....	.....	.....	.....	71	Jan 6 ○	.....	.....	.....
1871	.....	.....	Jan 17 Jy 2 ○	.....	.....	.....	.....	Dec 12 ●	72	.....	.....	.....	.....
1872	My. 22 Jun 6 ○	.....	.....	.....	.....	.....	Nov 15 ○	.....	73	.....	.....	.....	.....
1873	My. 11 ○	.....	.....	.....	.....	.....	Nov 6 ○	.....	74	.....	.....	.....	.....
1874	My. 1 ○	.....	.....	.....	.....	Oct 10 & 25 ○	.....	.....	75	.....	.....	.....	Ap 5 ●
1875	.....	.....	.....	.....	.....	Sep 30 ●	.....	.....	76	.....	.....	Mr. 11 ○	.....
1876	.....	.....	.....	.....	Sep 3 ○	.....	.....	.....	77	.....	.....	Feb 27 ○	Mr 14 ●
1877	.....	.....	.....	Aug 23 ○	.....	.....	.....	.....	78	.....	Feb 17 ○	.....	.....

	Vaiśākha	Jyeshtha	Aśadhā	Śravana	Bhādrapada	Āśvina	Kārtika	Mārgasīra		Pushya	Māgha	Phalguṇa	Chaitra
1890	.....	.....	Jun 17 ●	.....	.....	.....	Nov 26 ○	Dec 11 ●	91	.....	.....	.....	.....
1891	My. 23 ○	.....	.....	.....	.....	.....	Nov 16 ○	.....	92	.....	.....	.....	.....
1892	My. 11 ○	.....	.....	.....	.....	.....	N 5 ○	.....	93	.....	.....	.....	.....
1893	.....	.....	.....	.....	.....	.....	.....	.....	94	.....	.....	Mr. 21 ○	Ap. 5 ●
1894	.....	.....	.....	.....	Se 14 & 29 ○	.....	.....	.....	95	.....	.....	Mr. 11 ○	.....
1895	.....	.....	.....	.....	A. 29 S. 5 ●	.....	.....	.....	96	.....	.....	Feb 28 ○	.....
1896	.....	.....	.....	Ag 8 & 23 ●	.....	.....	.....	.....	97	.....	.....	.....	.....
1897	.....	.....	.....	.....	.....	.....	.....	.....	98	.....	Jan 22 ●	.....	.....
1898	.....	.....	Jly. 3 ○	.....	.....	.....	.....	Dec 12 ○	99	.....	.....	.....	.....

	Vaiśākha	Jyeshtha	Ashāḍha	Śrāvana	Bhādrapada	Āśvina	Kārtika	Mārgaśīra	Puṣya	Māgha	Palmāṣa	Chaitra
1911	Oct. 22 ●	.....	1912	.....	.....	Ap. 2 ○
1912	Ap. 16 ■	.....	.....	.....	Sep. 26 ○	Oct. 11 ●	.....	.....	13	.....	Mr. 22 ○	.....
1913	Sep. 15 ○	.....	.....	.....	14	.....	Mr. 11 ○	.....
1914	A. 21 S. 4 ○	.....	.....	.....	15	.....	Feb. 14 ●	.....
1915	Ag. 10 ●	.....	.....	.....	.....	16 Jan. 20	Feb 14 ●	.....	.....
1916	Jy. 15, 30 ○	.....	.....	.....	.....	.....	17 Jan. 8, 24 ○	.....	.....	.....
1917	Jun. 19 Jy 4 ○	.....	.....	.....	.....	Dec 28 ○	18	.....	.....	.....
1918	Jun 8, 24 ○	.....	.....	.....	.....	.....	Dec 3 ●	19	.....	.....	.....
1919	My. 29 ●	.....	.....	.....	.....	Nov. 8, 22 ○	.....	20	.....	.....	.....
1920	O. 27 N. 11 ○	.....	.....	21	.....	.....	Ap. 7, 22 ○

In the first twenty six Anuvākas of the Tait. Aranyaka we are told of the cycles of 1,000 days and 7 intercalary months termed seven Adityas. From that we inferred that the author of the Aranyaka is talking about a cycle of eclipses and classified the several gods associated with the seven Adityas and their 1,000 days as the names of eclipses occurring in each of those cycles. Now the Aranyaka is going to take us with another practical part of the subject. It is a diagram of the celestial circle to illustrate the cycle that has been so far taught. (See Diagram II) In 1, 27, 2 it says that there is a Chakra called the Ayodhyā pūr of gods. In that city there is a golden Kośa called Svarga pervaded with constant light. Brahma (moon) has also entered that city which is pervaded with Yasas. Around that city and up and down is constantly going one (the sun) who is learned and who has neither old age nor any disease and who is unknown to death and who sees both the gods and the Asuras. It also says that whenever the young maiden makes a Mandra or deep sound or when the faithful house-wife violates chastity, then Agni touches and pierces through (her). Then the Aranyaka tells us in 1, 31 that there is Vaiśravaṇa with Tvashṭri on the other side of the water which prevents us from seeing him. His Chakra also contains 1,000 and he comes to us to receive the offerings made by our people to him in the form of money, cows, elephants, gold and horses. It says that this circle of one hundred Padas and eight Chakras or entrances is to be found in the hills called Sudarśana, Maināka, and Krauncha and that it is a Chakra drawn in Samhārya form.

What we have to particularly notice and understand in the above portion is the purpose of the Ashtāchakra

with Navadvāra of the gods and the transgression of the young maiden and her being touched and struck by Agni. We have also to understand who the Brahma and the learned one that are moving in that city are. Here as elsewhere, Brahma is the moon who is believed to create offsprings every new moon. The learned one is evidently the sun who goes round that city and also up and down that city. Accordingly the eight Chakras or circles of that city are evidently the eight monthly circles corresponding to the seven or seven and a half or eight months, that is, the intercalary months that occur in the course of 19 or 20 yrs. In a year of twelve months, the first four months are called the part of the gods, the second part of four months is called the division of the Pitries and men. The third part of four months is assigned to the Asuras whose chief is Kubera Vaiśravaṇa addressed as Rājādhirāja. He is worshipped as the great Yaksha to avert calamities, spirits, and evils connected with eclipses. Now when the eight monthly circles of the cycle of 19 or 20 years is on the side of the gods and men in the celestial circle, the remaining part of 4 months must necessarily be on the other night part of the celestial sphere occupied by Kubera and his Asuras, Yakshas, Gandharvas and other beings wandering at night.

The seven monthly circles are the seven circles parallel to the equator. Inclusive of the equator, they amount to eight concentric circles. The extremities of each of these circles form East and West points of each monthly circle. If from the extremities of each of the seven circles lines are drawn to the zenith point, seven triangles are formed with the three lines, namely:

- (1) the line from East point to the West,
- (2) the line from East point to the zenith,
- (3) the line from the zenith to the West point.

The sun is considered to pass from the East point to the zenith, from the zenith to the West point, and there set and rise again in the East point the next day and repeat the same process till the close of the month. In the same way in the next circle in the next month, and so on till he passes through all the seven circles. Then the Ayanas change. When the Ayana of five months with five monthly circles begins, then also the sun is supposed to perform his daily and monthly circuits in the same way for five months and thus close his yearly revolution, if it is an ordinary year. If it is an intercalary year of twelve months, he will make 32 yearly revolutions corresponding to the 33 yearly revolutions of the moon. Thus the sun is supposed to pass through these 36 angles in every ordinary or intercalary year.

The moon is also considered to pass through such circles of his own. Each of the three lines forming the seven or twelve triangles is called a *Danḍa*, each triangle being formed of three *Danḍas* or *Nabhyas*, as they are also called. It is an occasion of an eclipse, when the *Danḍa* of the sun and that of the moon coincide with each other.

So for it is clear. What remains now for us to understand is the transgression to which the young maiden is said to be liable. As already pointed out, eclipses are looked upon as a kind of seduction of the eclipsed planet by a *Yaksha* or *Gandharva* noted for music with which the *Gandharvas* attract men and women and kidnap them. When an eclipsed planet sets

before the eclipse clears off, it is called abduction and captivity of the planet. Hence Kubera, the lord of the Gandharvas, is worshipped and given rich offerings to keep his Gandharvas under his control. Agnivedha means fire-ordeal. It is believed that if a person is not hurt by fire through which he passes to prove his innocence, he is considered not guilty.

Now as a rule eclipses will occur only when the earth, the sun and the moon are on a line, that is, when they are revolving, as it were, round an axel passing through their centre, or along their edges like the stick of a lute placed over the sounding gourds. (Diagram I) When two or three round bodies are on a line or touch each other, they are said to strike (to make a Vedha of) each other. As Agni is believed to be in the centre of the earth, he comes in a line with, that is, makes a Vedha of, the two other bodies, the sun and the moon. If the sun comes between the earth and the moon, the Danḍas of the sun and the moon coinciding, it is a lunar eclipse and when the moon comes between the other two, it is the solar eclipse. The eclipsed body or person is then called Dandya, liable to Danḍa. Always it is the eclipsed body that is considered guilty. If it gives up Danḍa or is far off from it, it is considered to be innocent. Thus Danḍa came to mean a fine payable by a guilty person. Danḍa also means a new moon, because the sun and the moon are in a Danḍa above or below the nodes.

It has been already pointed out how laughter, crying, flute, and dancing are associated with eclipses. The celestial sphere, that is, the visible semisphere is, as explained above, divided into eight circles called Chakras. They are called, 1. Bhūh, 2. Bhuvah, 3. Suvah, 4. Mahah, 5. Janah, 6. Tapah, 7. Satya. (See Diagram II)

The cord from the East point to the pole is divided into one hundred Padas. The Bhūloka is made to extend from the East point 11 Padas upwards. The Bhuvah extends likewise from 11 Padas to 22 Padas. Likewise Suvah extends from 22 to 33, the Mahah from 33 to 44, the Janah from 44 to 55, the Tapah from 55 to 66; the Satya from 66 to 77; and the eighth Chakra called Tripāth from 77 to 99 and then comes above it the Apāth (10th) with no Padas assigned to it. The Tripāth is the Arctic circle where the day and night are each of six months duration. In the lower circles they vary (vishurūpe), the day becoming longer in the period from winter solstice to summer solstice and the night shorter, while in the other Ayana the night becomes longer and the day shorter. In the circle where the Vedic poets lived long ago the day in the Northern Ayana was 14 hours (Ashtādaśamuhūrtah) and the night 10 hours (Dvādaśamuhūrtah). The Sūryapragnapti frequently refers to this topic. This corresponds to about 40° latitude, as already pointed out. The seven notes from Sā to Nī are also made to correspond to the seven Lokas from Bhūh to Satya. The exact pitch of the notes are compared to the natural notes produced by the seven animals, such as 1. the, Peacock, 2. Kine, 3. Goats and Sheep, 4. The Krauncha bird, 5. The Kokila bird, 6. The Horse, and 7. The Elephant.

That this classification or allotment is Vedic, is clearly hinted in the Tait. Ar. 1, 12. There Indra at the beginning of a new cycle of eclipses is addressed to come in his chariot of green horses with peacock-leathers. Corresponding to the note Ri, the eclipses in the second cycle are called kine and the victims immolated are also kine. Likewise the other animals are made to correspond to the names and victims of eclipses in the

other circles. This is what the poet means when he says that if one hears 'im' sound on the occasion of an eclipse, then one hears of guilt or crime (Tait. Ar. 1, 3) and that according to Vāsishṭha Rauhiṇa the note of the thunder is like that of a cow. (Tait. Ar. 1, 12).

Like the notes of the gamut, alphabetic letters are also connected with eclipses. The followers of the Tāntric cult write the 'im' sound of their fifteen syllabled Mantra like three dots placed in a curved line, or rather like the Tryambaka or Rudra eclipse. The form of the 'l' letter in the Asoka alphabet is a Tryambaka. The city of eight circles and nine doors with 100 Padas which is just explained above is called Śrīchakra in the Tantra literature and is worshipped through out India. Further researches into the Sāma Vedic literature in connection with the distribution of Sāmachants in the cyclic sacrifices of the cycle of eclipses and into the Tantric literature in connection with the Śrīchakra and the distribution of letters in the Charkra will not fail to throw some more light on the origin of the notes of the gamut and also of the alphabetic letters from the cult of the cycle of eclipses. The name of the fifteen syllables of the Panchadasi mantra, such as, I Kāma, Yoni, and the like seem to be the names of eclipses. Translated into English, the names mean, 1. Moon, 2. the sun, 3. Rudra or Tryambaka, 4. Vajrapāṇi or Indra, 5. Hasa, laughter, 6. Mātariśvan, wind, 7. Abhra or Indra, 8. Three Caves or Māyas meaning the setting of eclipsed planets? As the main point under consideration is not the origin of the gamut or of the alphabet of the Śrīchakra of the Tāntric cult, but the divine city of 100 Padas, eight circles and nine entrances connected with the Vedic sacrifices and cycles of eclipses, I confine my attention to the consideration of that point alone.

CHAPTER V.

THE SRICHAKRA.

I have explained that the city of eight circles is no other than the Northern hemisphere of the celestial sphere divided into eight parts, as shown in the diagram No. II. That this is the city of the gods is corroborated by the Skambha hymn of the Atharvaveda 10, 8. While the general belief underlying the Vedic cult of sacrifices is that eclipses are caused by the Māya of Yakshas and Gandharvas, the poet of the Skambha hymn seems to laugh at the above belief and point out the true cause of eclipses by his illustrative example of water-pots. Hence the hymn is very interesting, and serves to prove the point under consideration. And it runs as follows:

"Salutation to that Jyeshtha Brahma which has seated itself on the past, future and all, and which has the heaven as its own. (1)

The sky and the earth stand held by it. In it there is the whole that animates, breathes and winks. (2)

Three are the circles of offspring running across; some more (four) are there round the sun; the Rajovimāna (three more circles or doors) stands prominent; the Harinīs have entered the regions (the points of the compass)."

Note—The three circles of offspring together with four more are the seven circles. The Rajovimāna is the triangle, the same as the sun and moon, (Bindu and Trikoṇa) of the Śrīchakra. Jyeshtha Brama is moon.

"This Vault is itself a circle of twelve spokes divided into three parts called Nabhyas; Who knows it? Around the rim of that circle are fastened 300 and 60 immovable nails." (4)

Note—This is an yearly circle with 12 parts corresponding to 12 montns, the latter being divided into 3 parts of 4 months each. Are not the 360 nails 360° ?

"O! Sun, know this—there are the sixt wins and one single-born—they want to have their place in this circle together with the seventh." (5)

Note—The difficulty is in making the day circle to extend so as to correspond to the seven intercalary months. With six months it is not difficult. But unless the zone is above 40° latitude, it cannot be extended to correspond to 7 months, that is, a day of 14 hours.

"The cave-like old Pada or Mahatpada (Jarannāma) is close to this circle above mentioned; in it is kept the movable and lie-like one." (6)

Note—This refers to the Arctic Circle and the movable one is the Pole.

"There is also the Circle of 1000 syllables with one circumference, front and behind. With one half of this the whole visible world is made; where is the other half?" (7)

Note—This refers to the circle of the intercalary year with 7 intercalary months in the visible half. The other half with 5 months must necessarily be on the other side.

"The circle containing the five months holds the front (of the year) and the two parts go jointed well; its

arrival is seen ; but its departure is not seen ; the front is near, but the lower is far off." (8)

(Imagine) a liquor gourd with its bottom turned up and having a hole on its side. In it Yaśas (liquor or Soma) of all forms is kept. On it are the Seven Bears who have become the guides of the Mahatpada." (9)

Note—The Seven Bears are quite different from the seven suns or sages mentioned before.

"What is yoked first, what later, what on the convex half, what round the vault, in correspondence to what sacrifices are they spread? That I ask you; what is that Rigverse which shows this? (10)

What is that which rises and which falls down? What is that which is movable, immovable, and winking and becoming? What is that which holds the whole concave vault and what is that which with the other part becomes one." (11)

Note—The pole and the circles below it are referred to here.

"(This sphere) is endless, spread on all sides ending, though endless, finally the past and future of this the learned keeper of thy Nāka (heaven) is examining and is moving." (12)

Note—The learned one is the sun himself.

"Prajāpati moves in the interior and becomes many, unseen; With half the visible world is covered; what became of the other half, the Ketu (flag meaning the other half of the moon)? (13)

ऊर्ध्वं भरन्तमुदकं कुम्भेनेवोदहार्यम् ।

पश्यन्ति सर्वे चक्षुषा न सर्वे मनसा विदुः ॥

This is to be illustrated by one who is carrying water with a pot up (on his head). All see this with their eyes, but do not understand it with mind. (14)

दूरे पूर्णेन वसति दूरे ऊनेन हीयते ।

One covers itself with another on its level (Pūrṇa) in distance and one is made partially visible (hīyate) by another lower than itself." (15)

Note—Of two pots of the same size on a level, that in front covers that which is behind. If one is lower, the other becomes visible to that extent.

महद्यक्षं भुवनस्य मध्ये तस्मै बलिं राष्ट्रभृतो भरन्ति ।

"There is the big Yaksha in the centre of the vault (world); to him the Rāshṭra-bearers make offerings." (15)

Note—The poet means that Yaksha is not the cause of eclipses.

यतस्सूर्य उदेत्यस्तं यत्र च गच्छति ।

तदेव मन्येऽहं ज्येष्ठं तदु नात्येति किं चन ॥

"Where the sun rises and where he sets, that (circle) alone I consider as the Jyeshṭha (spoken of above); nothing goes beyond it. (16)

Those who speak of an old learned being of Vedic body as moving up and down (arvāg) and round in that circle say that that being is the sun, the second is Agni (the earth with Agni in its centre,) and the third is the threefold moon (Trivrit Hamsa). (17)

While flying to Svarga, the wings of that Hamsa called Hari are expanded with thousand days each; he journeys having kept all the gods clinging to his breast and looking on all the worlds." (18)

Note—This refers to the Eclipse-cycle in which the solar and the lunar years come to the same point.

"The topmost circle warms itself with Satya; the lower one looks up with Brahma." (19)

Note—Satya and Brahma are the names of the Arctic and Antarctic circles.

"It (the hemisphere) breathes with Prāṇa horizontally with Jyeshṭha clinging to it." (20)

Note—This refers to the equatorial circle.

"He who knows the Fire-drills with which Vasu (the fire) is churned knows, being himself a wise man, that Jyeshṭha and also that Mahat Brahma." (20)

Note—In verse 9, the poet compared the sphere to a liquor gourd with its bottom turned up and open in the middle like two half cups. Here he compares the same to two semi-circular Araṇis. (Fire-drills).

"(In this hemisphere the topmost called 'Apāth' comes first) and it has the Svarga world located in it; becoming fourfold, it becomes enjoyable and contains all that is edible." (21-22)

Note—Of the 8 circles into which the hemisphere is divided as the city of the gods; the upper one is undivided, as its division serves no purpose. It is Svarga, always covered with light (Svargo Jyotisha vritah-Tait. Ar.) The lower eight circles up to the equator are Bhogya, enjoyable.

"Having become enjoyable, it gives plenty of food; those who worship it as the eternal call it the eternal, though now it becomes regenerated often. (In the Arctic circle) day and night exchange their form with respect to colour." (23)

Note—In the Arctic circle there is a day of 6 months and a night of 6 months. There is change only in their colour, but not in duration as in other circles.

"In that Arctic circle are kept a hundred, a thousand, a ten thousand, an Arbuda, or infinite masses of wealth (our days regarded as wealth); this wealth they (others) carry off before the eyes of the very god who likes it to possess. (24)

The crescent moon less than the Bāla (three days old after new moon) there is one; one less than the latter may or may not be visible. By him (the moon) thou, O! Sāvitrī, art embraced as "my dear goddess." (25)

This auspicious Sāvitrī, never growing old, and immortal is in the house of man (the earth), is given in marriage; He who took her hand and he who joined the hands (of the sun and the new moon) grew old. (26)

Thou, O! Sāvitrī, art a female, or male, a youth or a maiden. Thou, O! Moon, growest old and deceivest with the stick (Danda) which thou holdest and passest along; and being born, becomest visible to the world (the earth)." (27)

Note—The moon is believed to be born again and again after new moon and is spoken of as the father of the next moon and grand father of the third moon or as the eldest of the succeeding moons and the youngest of the previous moons. The sun is spoken of sometimes as a maiden and at other times as a youth. New moon occurs when the sun and the moon are on a Danda, a line, the planes, however, being different. If the planes are the same, that is, when the sun and the moon are exactly on a Danda, as explained above, then eclipses are caused. The poet makes this clear in the next verses.

"One god (the moon) has entered the mind, becomes reborn, and is in the womb inside. (28)

(Of two spheres on a line) one comes up from the other or one is poured over by the other; Now let us know that from which this phenomena of pouring over is seen. (29)

This one as eternal and born of the same source and very old, facing all is the goddess, Earth, shining from the dawns and she responds with every winking. (30)

The goddess called Avi is pervaded with Rita (centre of the earth); from her colour these trees appear green. (31)

She never leaves that which is near and never looks at that which is near. See the creative skill of god, which never dies nor grows old. (32)

They give expression to all kinds of speeches and say that that place to which the sacrificial Vadanties (expressions) are addressed is that Mahat Brahma, moon in which gods and men are found as spokes sticking to the central nave or hub. I ask about that flower of the waters where that nave is kept. (33 & 34)

Who and how many are those who propell the waters, whom they look upon as oblation, and from whom the wind blows, and who give us these five similar points of the compass? (35)

Of these one occupies this earth; another the atmosphere; he among them called Vidhartri gives us the sky; and others keep the quarters all. (36)

He who knows the thread which is extended and in which these offsprings are sewn, he who knows the thread (which is at right angles) to that thread can know the Mahat Brahma. (37)

In the midst of those threads (the horizontal circles and those that are at right angles to them) the sky and the earth together with the all-burning fire are located; wherein are those who have the one for their husband, where was the Mātariśvan then? (39)

The Mātariśvan then was in the waters, the gods also entered the waters; the big Rajovimāna (of the moon and the sun) stood there; the Pavamāna (the moon) entered the quarters. (40)

(The sun) rose up by the Gāyatri measure (24) above the north or by Sāma measure, say those who know Sāma; then where was the Rajas? (41)

He who puts and joins the Vasus is the Sāvitrī like a god of unfailing Dharma; Indra has no place in the war for Vasus. (42)

This lotus circle of nine doors pervaded with three qualities (black, red and white colours) is there; Those who know Brahma understand the Yaksha within it. (43)

There is the immortal self-born with no desire, bold, satiated with the juice (Soma) and inferior to none; He who knows Him is not affraid of death and looks upon himself as a bold young one with no old age. (44)

This long hymn is quoted here to show that the Vedic poets were not unaware of the real cause of eclipses. They knew that in Mahāmeru, the pole, the sun never sets and is called Kaśyapa. They knew that in the Arctic Circle called the Tripāth the sun never sets for six months and never rises for another six months. This they expressed by saying that day and night exchanged their places in that circle. They called the day in the Arctic Circle Mitra and the night Varuṇa. They knew that in the lower circles the length of day

and night varied and that in the latitude in which they could see and saw not merely the concave arch of the celestial circle corresponding to six months, but also one-third of the vault more corresponding to two months more, that is, eight months in all ; and that the remaining two-thirds of the spherical globe was on the other side, where ignorant people placed Yakshas and Gandharvas with Kubera at their head. The imaginary Kubera grew enormously rich with the valuable offerings given to him by the people for keeping the eclipse-causing spirits under his control. The poet of the above hymn is quite familiar with the cycle of 1000 days called the cycle of eclipses and also the city of the gods with eight circles and nine intervening spaces and the cord of the quadrant divided in 100 parts. He knows that the sun's Northern declination is only 33 of the one hundred Padas. It is hoped that the above hymn will establish beyond doubt that they had a cycle of eclipses and with it predicted the arrival of Mitra, Varuṇa, Indra, Kṛishṇa, Śyāma and other astronomical phenomena personified as gods and with or without eclipses. The Rajo-vimāna seems to be a name given to the cause of eclipses. The Jāinas say that Rāhu-vimāna is the cause of eclipses.¹

The Purushasūkta is nothing but a description of the city of the Gods. Considered in this light it becomes quite intelligible. In. A.V. 10, 8 the city of eight circles and nine entrances is made to consist of three divisions: 1. Apāth; 2. Tripāth; 3. Chatuspāth.

Of these, Apāth, the Pole, is only one and the Tripāth below it is also one, but threefold, that is, made

1 See Sūryapragṇapti.

up of thrice the area of each of the seven circles each of which is called a Chatuspāth. It is yet one and has two aspects, that of a day of 6 months and that of a night of 6 months. Below this Tripāth come the seven circles of bipeds and quadrupeds. These seven divisions are called variously. They are seven Dvīpas, called Jambu, Plaksha, Kuśa or Barhi, Krauncha, Śāka, Śālmali and Pushkara. They are also called the Salt sea, the sea of Sugarcane juice, that of liquor, butter or ghi, curds, milk and nectar. They are also the notes of the Gamut, Sa, Ri, Ga, Ma, Pa, Dha, Ni; seven animals, such as man, horse, ass, cow, goats and sheep, dog or camel. The other side of the sphere has for its animals wild beasts. Now let us see how this idea is implied in the Purushasūkta.

(1) Purusha hath a thousand heads, a thousand eyes, a thousand feet. Pervading the earth on every side he has risen ten Angulas high.

(2) Purusha in truth is this all, the past and the future; and lord, too, of immortality, and also of what grows by food.

Note—His rising by ten Angulas seems to mean the ten Angulas of shadow cast by a gnomon which is also called Purusha. When the shadow is shortest, as on the day of summer solstice, then Purusha is called Vāmana, the dwarf incarnation of Vishṇu. A.V. 19-6 has 1,000 arms. It makes no difference, for all that is intended to be meant is a cycle of 3,000 days, which gives three intercalary months and another 3,000 on the other wing of the bird-like Purusha which gives another three months.

(3) So mighty is his granduer; yea, greater than this is Purusha. All creatures (that is, the earth with all creatures) are a Pāda of him; his Tripāth is in the

sky; he rose up above Tripāth; his Pāda again was here (that is the pole).

“(4) Thence he moved forth to every side over what eats not and what eats.”

Here the earth is one Pāda, foot, of Purusha; his Tripāth, *i.e.*, the Arctic Circle, is in the sky and unlike the earth which is mortal, the Tripāth and also the Pāda above it are immortal (Amṛita), because they remain unaged and unchanged always.

(5) From him Virāj was born; again Purusha from Virāj was born, he spread to West and to the earth in front.

Note—Here Virāt means ten as elsewhere. From Pāda he came out covering ten divisions, that is, the three divisions of the Tripāth, and seven divisions below it, ten divisions in all. This lower sevenfold division is made clear in the next verse.

(6) When the gods performed the sacrifice with Purusha as offering, spring was the Ghi, summer the fuel, the autumn the oblation. Then seven were the circles (Paridhis=Mandālas=bounding circles); thrice seven were the kindling fuels.

Note—Paridhi taken in any other sense makes the whole hymn meaningless.

(7) When gods performing sacrifice bound Purusha as the Victim, that sacrifice they terminated with Barhi or Kusa (circle, that is, the 4th circle); and also the Purusha that came next;

(8) With that victim (Purusha) the gods performed the sacrifice, likewise the Sādhyas and the sages did so; from that general sacrifice, clarified butter was gathered up;

(9) They formed the creatures of the air, and animals, both tame and wild;

From that general sacrifice Rig-verses and Sama-chants were formed; the seven metres were also formed; and Yajus-formulas were for med.

(10) From it horses were born; also those that have two rows of teeth; from it there came kine and also goats and sheep.

Note—Animals such as Purusha, tame and wild animals, cows, goats and sheep and horse, Kuśa grass and Ghi all these are not merely sacrificial victims and offerings, but also symbols denoting corresponding circles of the Chakra—(Vide the Diagram II). These victims are sacrificed in atonement for the sin of mankind which was believed to be the cause of eclipses. The animals and the circles which they signify are believed to correspond to the forms of eclipses occurring in the different parts or seasons of the cyclic year.

(11) When they divided Purusha, (for making a Chakra corresponding to him), how did they arrange his limbs?

(12) What was his mouth, what were his arms, what are the parts of the circle corresponding to his thighs and feet.

(13) The Brāhman was his mouth, the Rājanya (Soma) was his two arms, his thighs became the Vaisya, from his feet the Śūdra was made.

(14) The moon came from his mind, from his eye the sun came out, from his mouth came Indra and Agni; and from his Prāṇa, Vāyu came out.

(15) From his navel came out the atmosphere, from his head came the sky, from his feet came out the earth, from his ear the quarters.

(16) Thus they formed the worlds also.

Note—The whole of the hymn is a symbolical expression of the diagram of the cycle of eclipses. Here Purusha means the cycle. The several limbs represent the several parts of the circles. The Pāda, Tripāda, and seven Paridhis are evidently the eight Chakras with nine Dvāras. The animals, the oceans, and the Dvīpas assigned to the seven circles denote the names of those circles. This is confirmed by the 16th verse of the Atharvavedic version of the hymn (19, 6). The verse is as follows—

मूर्ध्नो देवस्य बृहतो अंशवस्सप्तसप्ततिः ।

राज्ञः सोमस्याजायन्त जातस्य पुरुषादधि ॥

From the Brihat representing the head of the Purusha, namely, King Soma, 77 Amsūs or parts came out."

These 77 with the 77-88-99 of the Tripāth, and one of the Pāda make up the 100 Amsūs ("Satadvāraṭṭāra gamam"—hundred doors of the eight Chakras—Tait. Ar.). According to the Tait. Ar. this is a Chakra found in Sudarśana, Krauncha and Maināka mountains and is Samhārya, drawn to show the world at the time of Samhāra, destruction. The other form of the Chakra is a symbol of Srisṭi, or creation. It consists of 1,000 parts. It gives 250 to a quadrant. The Chakra of the Purusha hymn is of this kind. For the seven metres are said here to have come out of this Chakra. The seven metres amount to $24+28+32+36+40+44+48=252$. According to A.V. 13, 1, 37 the cycle of Rohita eclipse

is spoken of as having 1007 births. This difference of 8 or 7 over 1,000 is due to the difference between the actual and theoretical number of days of the cycle in consideration. As already pointed out, Indra's cycle is nearly 57 years. It means an eclipse recurring thrice in 57 years in the part of the Chakra denoted by the mouth of Purusha.

It follows therefore that the Purusha hymn is a general expression of the Ashtāchakra of the cycle of eclipses.

The Saundaryalaharī speaks of the same in terms of Purusha's limbs as follows—

महीं मूलाधारे कमपि मणिपूरे

हुतवहं स्थितं स्वाधिष्ठाने हृदि मरुतमाकाशमुपरि ।

मनोऽपि भ्रूमध्ये सकलमपि मित्वा कुलपथं

सहस्रारे पद्मे सह रद्वसि पत्या विहरसे ॥

O! Sakti, thou art in combination with thy consort in secret in the thousand-petaled circle of lotus, having gone up there piercing through the Kula-path, which consists of—

(i) the earth in the Mūlādhāra circle (a circle at the hips),

(ii) the four water circles in the Maṇipūra circle (a circle passing through the navel),

(iii) the fiery zone located in its own place in the same (fourth circle of the) Maṇipūra,

(iv) the sevenfold Marut circle in the region of the heart,

(v) the circle of the sky (dyauh) above the Marut circle,

(vi) the circle of the Mind (the moon) in the midst of the brows."

Evidently the Śahasrāra contains the Tripāth and Apāt or Pāda divisions together with seven circles.

In A.V. 4, 30 the same Chakra is described as follows—

"I move with the Rudras, the Vasus, the Ādityas, and the Viśvedavas (eclipses named as such); I move with both Mitra and Varuṇa of Tripāth circle); I bear Indra and Agni; and both the Aśvins; I am the dominion, collector of Vasus (wealth); I am the first prophetess of the worshipable (seven).

I make the bow for Rudra to kill the haters of Brahma.

In A.V. 5, 28, we have an interesting account of the three cities, that of gold, that of silver and that of iron.

"He measures the nine¹ Prāṇās with nine for a long life of a hundred autumns, three in the yellow region, three in the silvery white region and three in the iron-black region with the circle of Tapas;

Agni, Sūrya, the Moon, the Earth, the Waters, the Sky, the Atmosphere, the Quarters, those angles between the quarters, the seasonal things with the seasons, all in concert, may lead me with the Trivrit. (9)

Let the three nourishments come within the nine; let Pūshan develop them with milk and Gḥi (of the circles);

Let plenty of food, of Puruṣa, and of the cattle be present here in the (nine circles);

Let the Ādityas with the Vasus sprinkle over this; O! Agni, develop them, growing thyself; O! Indra, create them and let the nine circles be included therein:

¹ The seven circles, the Tripāth and the Apāth.

May the earth keep thee with the yellow ; may Agni nourish thee with iron ; and make thee fit well with the white ;

In birth it came as threefold ; the golden one became dear to Agni ; That which was of Soma pressed (eclipsed) fell down ; one of the waters became the seeds of the creators (moons), thus the threefold golden may be for thy long life ;

Threefold is the age of Jamadagni in the Pāda division ; Pada region ; threefold is that of Kaśyapa (in the polar region) ; threefold is the age of Amrita (of the Tripāth region) ;

May the **golden one keep the sky** ; may the **white one keep the middle region** ; and may the **iron one keep the earth** ;

May these three cities of gods protect you.
I make the ten Easts (East to West circles.)

In another Purusha hymn (10, 2, 25-33) the Atharva-veda describes the city of the gods as follows:—

With Brahma the earth is made, Brahma became the Northern sky ; Brahma is the upper and the crosswise atmospheric region. Having well sewn its head, and also the heart, Atharvan rose up above the head ; the Pavamāṇa (the moon) also rose up the head ; That is verily the head of Atharvan, the cell of the gods ; Prāṇa (the sun) keeps it up, also he keeps food and mind (moon) ;

Purusha became the whole,—what is created above and what is created crosswise ; who knows the city of Brahma, from which he became Purusha, knower of the city,

- To him who knows the city of Brahma surrounded with nectar,—to him Brahma, and those from Brahma give the eye, life, and offspring;

Him the eyes never leave, nor the life-breath before old age; He who knows the city of Brahma, on account of which knowledge, He is called Purusha.

Eight are the circles and nine the entrances which make the Ayodhyā city of the gods; in it is the golden cell called Svarga always lighted with light (the Polar region);

In that golden cell with three spokes placed thrice, is the Yaksha possessed of animation; that the knowers of Brahma understand;

That golden Prabhājamāna cell of yellow colour pervaded with Yaśas, that golden city which is impregnable, Brahma has entered."

Here the Golden cell (Hiraṇmaya-kośa) always pervaded with light is the same as the Apāth of A.V. 10, 8, 21. It is also identical with the Bindu of constant light of the Śrīchakra. Below it comes the eight Chakras, namely, the Tripāth and the seven circles with Chatuspāths (quadrupeds) assigned to them. The three spokes, the same as the Trikoṇas or triangles of the Śrīchara, are the three Daṇḍas explained above. The three Nabhyas of A.V. 10, 8 are the same. It is this Daṇḍa with which the moon is said in A.V. 10, 8 to deceive others causing them to consider him to be an old ascetic with no energy left in him to elope with maidens. The story of Arjuna's disguise as an ascetic with a Daṇḍa or three Daṇḍas, his marriage with Subhadrā, Kṛṣṇa's sister, and his running away with her can be traced to this source.

Sāyana in his commentary on the Tait. Āraṇyaka and Lolla in his commentary on the Saundaryalahari (Verse 11) hold that the Asṭā-chakra is identical with the Śrīchakra. This Diagram (See Diagram III) seems to be so constructed as to indicate a sandhi or parva by the meeting point of two lines and a Marma or an eclipse by the meeting point of three lines.

द्विरेखा सङ्गमस्थानं सन्धिरित्यभिधीयते ।

त्रिरेखा सङ्गमस्थानं मर्म मर्मविदो विदुः ॥

Besides being an object of worship and also an amulet, the Śrīchakra seems to have enabled them to predict by the numbers placed on the Vasukoṇas, the Rudraṇas and the Manukoṇas the solar or lunar eclipse to come after the first eclipse of the cycle is witnessed.

The followers of the Tāntric cult count the eclipses of a cycle not as Vasus, Rudras and Adityas, but in terms of angular points called Vasukoṇas, Rudraṇas, and Manukoṇas of the Śrīchakra. The verse in which the solar and lunar eclipses of a cycle are counted runs as follows—

बिन्दुत्रिकोणवसुकोणदशारयुग्म-

मन्वश्चनागदलसंयुतषोडशारम् ।

वृत्तत्रिभूपुरयुतं परितश्चतुर्द्वादशी-

चक्रमेतदुदितं परदेवतायाः ॥

A Bindu, a triangle, an octagon, two decagons, one of fourteen angles, an octagon and one of sixteen angles, three circles; and three more circles called Bhūpura, four and four doors on each of the four sides,—this is the Śrīchakra of the great goddess. Here Bindu (dot) is the

name of the moon; and Trikoṇa is that of the sun, signifying Savitri's productive power. The moon or Śiva, as he is called in the Tāntric literature, is given four Chakras and the sun, called Śakti, is assigned to five Chakras. One octagon, two decagons, and one of fourteen angles together with a triangle and a Bindu are the five Chakras of Sakti. The total number of eclipse-points are $8+20+14=42$. The triangle and the Bindu are not taken into account. They are the moving bodies, the triangle being the sun and Bindu the moon. Those of Śiva are one octagon, one of sixteen angles, and two triple circles making four Chakras. The total number of eclipse points of the moon are $8+16+3+3=30$. The author of the Saundaryalahari makes the solar points, however, 44 counting the Bindu and the triangle as two and adding them to the above 42 points. The commentator on the saundaryalahari makes it 43 leaving the Bindu. The angular points are not, however, disassociated with their Vasu, Manu, Rudra and other Vedic names. The Vasukoṇa is of the Vedic Vasu eclipses; the two decagons are two figures or diagrams showing the angular points of 20 Rudra eclipses, the remaining two Rudra points being added to a Manukoṇa figure of sixteen angles denoting sixteen lunar eclipses.

I now proceed to give a few examples of reference made to eclipses in the Atharva Veda:—

In A.V. 1, 1 Vāchaspati is said to be the strongest of the 21 eclipses. In the Tait. Ar. 1, 10 Bṛihaspati and Rudra are said to be the two sons of Dyāvāprithivī with two thousand days for their cycle and Saramā, the four-eyed dog, to be their daughter. Evidently the first

solar eclipse in the cycle is Brihaspati, the second is Rudra, one solar eclipse with one lunar eclipse preceding and another lunar following; Saramā is a group of four eclipses, probably two solar and two lunar. Vāchaspati is called upon to come again.

In A.V. 1, 4 "Ambayah and Jāmayah" signify the appearance of two lunar eclipses and one solar eclipse, one after another as the eyes of Rudra in the rainy season.

In A.V. 9, 3 the bull is called the bearer of 1000 and Indra is said to have drunk a pot full of Soma and Indras's arrival is said to have been previously marked by Brihaspati and Saramā.

In A.V. 9, 5 the offering of a goat is praised and the goat is said to dispell the darkness (of the eclipse) (lunar) and to ascend to the third heaven. The goat (Aja) is said to be bearing 1000 and to have kept the earth and heaven with 7 rays (7 intercalary months).

In A.V. 9, 10 the grey-haired one (the sun) is said to have swallowed the youthful moon running on the surface of water. The poet wonders at the skill of the god in virtue of which one that died the day before came to life again the next day. He thinks that the cause of the double seed is Nirriti. He refers to the first two Apāth and Tripāth divisions of the nine celestial Padas or divisions which Gauri is said to measure. He speaks of the arrival of Krishṇa with 1000 syllables.

A.V. 12, 2, 40-44 describes a solar eclipse (Avih Krishṇa) as a bull attacked by a wild beast, and Agni is prayed to for repelling the attack, a black sheep or Sīsa, lead, called Chandra (silver) is the ransom for the

Kravyāda who has the sun under his clutches. He is said to have given back the sun in the West and gone on his way.

In A.V. 13, 1 a solar eclipse of red colour (Rohita) is said to have occupied the region from the earth to the sky and to be the initial point of another creation, that is, another cycle of eclipses (L. 25). On this occasion Indra is said to be at liberty to drink Soma. The cycle of 1,000 syllables and nine Pādas (entrances) is also mentioned. In line 56 the poet says that he is going to cut at the root of him who, while illuminating the earth with his foot, likes to pounce upon the sun in the West, so that the cause of the eclipse may not make another shadow again.

In A.V. 13, 2 the sun (Śukra) is said to have been freed from darkness and Atri is stated to have placed him again in the sky after freeing him from darkness. In line 7-8, the circle of 100 rims and seven suns or horses is mentioned. Regarding Atri's connection with solar and lunar eclipses, we read in Rig. 5, 40, 7 as follows—

"Let not the oppressor with this dread, through anger swallow me up, for I am thine, O! Atri. Mitra art thou, the sender of true blessings; thou and king Varuṇa, be both my helpers.

Mitra and Varuṇa are, as pointed out above, the gods of a day of six months, and a night of six months respectively in the Arctic (Tripāth) circle. Accordingly when there is a solar eclipse in the lower zones in the six months from autumnal to vernal equinox, there can be no solar eclipse in the Arctic circle, for there is no sun there at that period. This seems to have been the

reasoning of Atri in rescuing the sun or the moon from the clutches of the demons of eclipses. This seems to be the meaning of the Rigvedic verse quoted above.

In A.V. 13, 3, the eclipse mentioned is Patanga. In line 9 a Krishna eclipse in the house of Rita is also mentioned. He is also said to have the seven suns placed in him; He is called Varuṇa in the evening, and Mitra in the morning; he is also stated to have his wings spread out with thousand days each. He is Indra when he burns in the midst of the earth and the sky. He is Atri in water. He is also Paṭara when high up in the sky. He is also Rohita. That these are all names of eclipses has already been pointed out. His Ekapāth is the Pole. His Dvipāth or Tripāth, as it is also called, is the Arctic circle. His Chatushpāths are the seven circles below the Arctic circle. We are told that Krishna eclipse is followed by an Arjuna eclipse, being the son of the night period from autumnal to vernal equinox.

Leaving out a few historical hymns like VII, 18 and 19, most of the hymns of the Rigveda are prayers made on the occasions of eclipses to appease the wrath of gods for the sin of man which is believed to be the cause of eclipses. Hymns addressed to Agni, Indra and Viśve-devas contain references to eclipses which are generally known as Vasus, Rudras and Ādityas. The Vasus are either vernal or autumnal; the Rudras pertain only to the rainy season with its bellowing bulls and milking cows set free by Indra; and the Ādityas to the winter season. Hymns addressed to Indra are accordingly descriptive of partial or complete solar eclipses of the type of the Krishna eclipse which, as already noticed, is described in the Tait. Aranyaka. Distinct are the references in

some hymns and vague in others. The following are a few hymns in which clear references to eclipses are made :

R.V. I. 10, 2 " The **ram** (the sun) hastens with his **troops**.

R.V. I, 13, 4 **Manu** appointed Agni as priest.

R.V. I, 14, 11 Ordained by **Manu** as priest.

R.V. I, 23, 14 Pushan, the bright, has found the king (Soma), concealed and **hidden in cave**.

R.V. I, 24, 10 Whither by day depart the constellations that shine at night; (they are) set high in heaven above us (now by day).

R.V. I, 33, 10 The foe of Indra sank during **darkness**.

R.V. I 36, 10 The gods for **Manu's** sake ordained.

R.V. I. 42, 2 Drive, Pushan, from our road **the wolf**.

R.V. IV. 28, 3 The archer, Krisānu, aimed and loosed the string to **strike** him (the moon).

R. V. I. 43, 8 Let not those who **trouble** Soma hinder us.

R.V. I. 45, 1 Worship the Vasus, Agni, here, the Rudras, the Adityas, all, who **spring from Manu**.

R.V. I. 51, 1 Make glad with songs **that ram** whom many men invoke.

R.V. I. 52, 1 I glorify **the ram** who finds the light of **heaven**.

R.V. I. 62, 5 (Sarama) praised by Angirasas with the sun **dispelled darkness**.

R.V. I. 74, 3 Even he (Agni) who slayeth **Vritra**.

R.V. I. 78, 4 Thee (Agni), the best of **Vritra's** layers.

R.V. I. 130, 9 Waxed strong in might at dawn he (**Indra**) **tore the sun's wheel off dark red**.

R.V. II. 27, 14 O! Indra, let not during darkness seize us.

R.V. III. 32, 17 To thee (Indra) proceed the dark.

R.V. III. 39, 7 He (Indra) took the light discerning it from darkness.

R.V. IV. 19, 14 Him (Indra) the black undulating cloud bedeweth in this mid-air's depth, at the base of darkness.

R.V. IV. 28, 3 The archer, Krisānu, aimed and loosed the string to strike him (the moon).

R.V. IV. 29, 2 Indra swiftly with might pressed down the wheel of Surya.

R.V. IV. 30, 4 Thou (Indra) stolest away the sun's car-wheel.

R.V. V. 1, 8 That strength the Bull (Agni) with thousand horns possesses.

R.V. V. 29, 10 One car-wheel of the sun thou rolledst forward and one thou settest free to move for Kutsa.

R.V. V. 33, 5 Thou (Indra), laidest him (Vritra) in the pit in darkness.

R.V. V. 40, 5 O! Sūrya, when the Asura's descendant, Svarbhānu, pierced thee through and through with darkness.

R.V. V. 40, 9 The Atri found the sun again, him whom Svarbhānu of the brood of Asuras had pierced with gloom. This none beside had power to do.

R.V. V. 45, 5 This day come to us; may our thoughts be holy, far from us let us cast away misfortune.

R.V. V. 45, 6 Where with Manu conquered Visisipra and where with the wandering merchant gained heaven's water.

RV. V. 45, 7 Sarama went aright and found the cattle.

R.V. V. 45, 10 He (the sun) hath yoked his fair-backed tawny horses.

R. V. VII 20, 2 Waxing in greatness Indra slayeth Vritra.

R.V. VIII. 85, 14 I saw the drop (Drapsa) in the far distance.

R.V. VIII. 87, 2 Thou, Indra art the conqueror; thou gavest splendour to the sun.

R.V. IX. 60, 1-2 Sing forth and laud with sacred song most active Pavamāna, laud Indu who sees with thousand eyes.

Thou who hast thousand eyes to see, bearer of thousand burthens,¹ they have filtered² through the fleecy cloth.

R.V. X. 54, 2 Men called thy (Indra's) battles (eclipse battles) illusion; no foe has thou to-day.

R.V. X. 54, 3 Who are the Rishis, (The seven sages=seven months) then, who comprehended before our time the bounds of all thy greatness?

R.V. X. 75, 5 He (Indra) cast away the gloomy mists, the darkness.

I think that these examples of eclipses referred to in the Atharvaveda and the Rigveda are enough to prove that the Vedic poets had a cycle of eclipses and that

¹ Cycle of 1,000 days.

² Filtering means clearance of the eclipse.

those eclipses were the measures of their seven Soma sacrifices.

It may however, be questioned why no commentator either on the Vedas or the Brāhmaṇas or even on any Tāntric work has a word to say connecting the numbers 1000, 72, 33, 14, 7 and the like with any cycle of eclipses or pointing out that the Ashtāchakra or Śrīchakra is a graphic representation of eclipses. So far as the Vedic texts themselves are concerned, there can be no doubt that such Vedic expressions as 'Three sheep', 'five sheep', 'cow, calf and bulls', and 'he-goat and she-goat', all mean eclipses, as already pointed out. Likewise the word graha itself is a general name to eclipses, Soma-graha denoting lunar eclipses and Aditya-graha solar eclipses, the earthly soma-juice being an imitation of the heavenly soma-juice drunk by gods and departed souls on the occasion of new moons or by demons of eclipses on the days of eclipses. The Vedic poets feared that on occasions of eclipses their fathers in heaven would be starved to death on account of the moon which is believed to be their food on the days of new moons being carried off and devoured by "the seven hunters, or seven wild beasts, or seven Chakravāka or moon-light-drinking birds, or seven swans living in the Mānasa lake. Hence they seem to have thought it necessary to perform a Śrāddha rite and offer rice-balls to the fathers on the days of eclipses. These verses are even now recited during the performance of Śrāddha rites together with the Vashaṭkāra formula of 17 syllables.

There were also other learned poets like the author of A.V. 10, 8 who strongly disputed the above view on the cause of eclipses. Thus there seems to have been

two Vedic schools, one blindly following the ancient view and practising the symbolical sacrificial performances and a second school of learned men who discontinued the sacrificial acts as useless.

It is also probable that the close connection of the Śrīchakra with Phallic worship compelled the line of teachers from the time of the Vedas downwards to strictly maintain the secrecy of the cult and captivate the mind of their students with mysticism of figures and words. The ancient teachers seem to have feared that if the perceptible scientific or natural phenomena of eclipses on which the whole of religious, philosophic, musical, medical, ethical, metaphysical and mythological literature is based were laid bare, their culture would fall to the ground and people would become atheistic or would pursue the worst practices of the Vāmāchāra sect of the Tāntric cult. Whatever might be the reason for the loss of tradition underlying the cult of eclipses which forms the main theme of the Vedas, this much is certain that the Vedas are the attempted explanations of the eclipses and the spells and charms devised to avert the calamities that would happen to gods, fathers and men from Vritra, Śambara and other demons of eclipses. Now I proceed to point out briefly the origin of the Epic and Purāṇic stories from the phenomena of eclipses and also the rise of the Vedic philosophy from the cult of sun and moon worship.

The union of the sun and the moon with or without eclipses seems to have given rise to certain speculations on the nature of auspicious and productive unions. The union of the planets on the occasions of eclipses seems to have been regarded as an open union and ordinary

lunations as secret unions with no fear of double seed and calamities. The author of the Tait. Ar. explains the secret of good union under five heads. Among them those for speech and learning are very interesting. In the case of speaking the lower lip is the mother and the upper one is the father. If the union of these two is well done in secret harmony, the tongue being the instrument, then good speech will be the offspring. In the case of learning the teacher must always be above the pupil and the pupil must not come in a line with the teacher. A good union of these two will result in good learning to the pupil, revision being the instrument.

The forms of solar and lunar eclipses seem to have given rise to the twenty-four Mudras of witchcraft. Figures like those of the sun (Gāyatrī, Sāvitrī and Sarasvatī) in the several eclipses of the cycle are formed with two hands and fingers, and the Gāyatrī is recited to exorcise evil spirits by all the twice born people in their morning, mid-day and evening prayers. The names of the figures are—

- (1) A disc-like figure;
- (2) The same with fingers not touching each other;
- (3) The same with fingers draws apart from each other;
- (4) A figure with two, three, four, five, six heads corresponding to the six solar eclipses in a line in the cycle;

Figures like an Anjali, like a cart, like a noose, like two things kissing each other, like a fist, like a fish, a tortoise, a boar, a lion, a cow's udder with two or four nipples, like a circle, a lotus and like a Linga. I have

already pointed out how the gnomon's shadow in various months forms figures like those of fish and other animals. This explains the traditional story that the various incarnations of Vishṇu were predicted by the sages and that they would take place in each Kalpa in their own time to ease the earth from its burden. The name, Ayodhyā, given to the drawing of the cycle of eclipses, or Śrīchakra, as it is called, points to the source to which the story of the Rāmāyaṇa can be traced. The Krauncha bird is connected with 'Ma' (Madhyama sound) of the gamut and eclipses on the fourth circle among the seven circles. The first or the basic verse of the Rāmāyaṇa to which Vālmīki, its author, has given expression speaks of the death of the male of a Krauncha pair at the hand of a hunter (nishāda—Rudra) and also of Rāvaṇa of the Krauncha family. It is given two meanings : a curse and a blessing.

मा निषाद प्रतिष्ठां त्वमगमद्दशाश्वतीस्समाः ।

यत्कौञ्चमिथुनादेकमवधीः काममोहितम् ॥

(1) O! Hunter, may ye not live long years, for thou hast killed the love-blind male of the Krauncha pair in union.

(2) O! Consort of the goddess of wealth, may ye live long, for thou hast killed the love-blind male of the Krauncha pair in union.

The male of the Crauncha pair is Rāvaṇa because he is said to belong to the Krauncha family. The seven Śāla trees are no other than the seven intercalary months of the cycle. Ten solar eclipses are probably personified as a ten-headed being carrying away the sun maiden. His heads like eclipses reappear in each cycle.

Likewise the story of the Pāṇḍavas can be traced to the same source. In a cycle of 18 years there are 108 seasons, of which 100 are real and the remaining eight or seven have become sages. Now just like an ordinary year the intercalary year also must contain 12 months. Accordingly if the seven or eight months are on this side of the circle the other five months must necessarily be on the other side of circle. The other side is night and wilderness. There is war between two sets, hundred on one side and five on the other. Unless the 100 are drowned, the five cannot occupy the territory on the eastern side. The hundred are the Kauravas, and the five are the Pāṇḍavas.

Likewise the story of Dussāsana's attempt to render Draupadi naked by pulling away her garment seems to owe its origin to the phenomena of clearance of a solar eclipse. Draupadī is said to be the daughter of Drupada. The word 'Drupada' means the foot of a tree. The Atharvaveda (IX, 9 and Rig. I, 164) speaks of a tree on which the sun and the moon have their abode as birds. One of them, the moon, is said to live on sweet Pippala fruits and the second, the sun, is spoken of as keeping on without tasting anything. The sun and the moon are also described in A.V. VII 8 as two young children at play, one in the East and the other in the West and sailing on the ocean. One of them is said to be a spectator of the world and the other to be passing through a series of births causing seasons. The moon is also described in a separate hymn as a flag coming in advance of the dawns and becoming new and new after every one of his many rebirths. He is said to be distributing his own body as shares of food due to the gods and

departed souls. The same tree that is said in A.V. IX, 9 to have afforded shelter to the sun and the moon is described in the Tait. Aranyaka I, 11 as having its root in the sky and its branches on the world down below. The Vanaspati of the Āpri hymns seems to be the same tree. It is at the foot of this tree that the sun and the moon come under eclipses which are spoken of as the magical influence of Asuras. As already pointed out, the Vedic poets regarded the arrival of eclipses in three colours. An eclipse of a black colour is called *Krishṇa*, that of a red colour *Rohita*, and that of white colour *Paṭara* meaning clothed as it were with a white garment. Accordingly the pulling or falling away of white garment means the clearance of an eclipse of the *paṭara* kind. As *Draupadi* may be taken to mean *Sāvitṛī* in *Paṭara* eclipse, can there be any doubt that the story of *Dussāsana*'s pulling away *Draupadi*'s garment is based on the doubtful clearance of the *Paṭara* eclipse of the sun? Likewise, the story of a sect of *Brāhmans* being under the fear of loss of *Brāhmanhood* due to the curse uttered by a learned woman called *Nāchiyar* (*Lakshmi*) for their causing her garment to slip down from her loins and of her withdrawing the curse on the condition of their going away from the locality of the woman within three days, can be traced to the same source. Here the *Brāhmans* are the moons. The learned *Nāchiyar* is the *Sāvitṛī* in *Paṭara* eclipse. The slipping down of her garment means the slow clearance of the *Paṭara* eclipse. Of course, no successive moons will remain near the locality of new moons for more than three days.

As regards the growth of the Vedāntic Philosophy of *Jīvātma*, the chain of births and deaths, *Māya* and

Moksha, I shall content myself with pointing out that the moon is, Jīva, as stated in Tait. Ar. I, the sun the Paramātmā or Prāna, teacher and the goal, as stated in the same Āraṇyaka; the births and deaths of jivas, the offspring of the moon on earth, are as many as those of the moon; eclipses are Māyas which are immemorial in origin and which, though ending, are ever recurring. Moksha, liberation, is within the reach of those who know it.

The most interesting point in the description of the Tait. Āraṇyaka of the Aṣṭāchakra with nine doors is its resemblance to Pythagorean theory of transmigration of souls, and of heavenly musical circles and triangles.

It is to be noted that we have not the same cycle of eclipses that the Vedic poets had before them. The features of the Vedic cycle are (1) the occurrence of three to five solar eclipses (Tryavi or Panchāvi), in a year, (2) the occurrence of solar and lunar eclipses in rapid succession (Rudra and Saramā), (3) the frequency of complete or almost complete solar eclipses (Śambara and his Forts), and (4) a greater number of visible eclipses in their cycle than in our own. None of our cycles possesses such characteristics in entirety. The Grahaṇadarpaṇa prepared by H. H. the late Mummaḍi Krishṇarāja Voḍeyar Bahadūr, king of Mysore, in Saka 1765 contains a table of 82 eclipses, 22 solar and 60 lunar with 22 intercalary months for the cycle or the period of 60 years from A.D. 1842 to 1901, all visible in Mysore. Swāmikannu Pillay's Table II of new moons and eclipses gives a list of about 142 eclipses, both solar and lunar, for the same period visible in India (Vide Chart of Eclipses). The same author has also given another Table (IV-L) of eclipses in his Indian Ephemeris. According to this

table the maximum number of possible eclipses visible in India and outside for the same period is about 302. Out of these about 124 are printed in *Italics* indicating their invisibility in India and the visibility of the rest (178) in India for the same period.

As the preparation of an accurate table of eclipses answering to the series of our own time or of the series of the Vedic period (B.C. 3101–B.C. 500 and 40° N. Lat.¹) is beset with such difficulties, I have left it for expert astronomers and contented myself with pointing out the features of the Vedic cycle of eclipses.

To sum up :—The cycle of eclipses was very widely known to all ancient nations. The Chaldeans knew it. The Biblical people were very well acquainted with it. The Romans had a fair knowledge of the same. The Vedic Aryans were no exception to it. According to the Hand-book of Astronomy by Chambers (Vol. II, PP. 464–467) references made in the Daniel and other parts of the Old Testament to 70 years and 7 weeks, 1200 years and the Messianic cycle of 33 years are all indisputably connected with the cycle of eclipses. As pointed out above, more numerous and distinct are the references made in the Vedic texts not only to the cycle of 1,000 days and its multiples indicating the interval of recurrence of Krishna and Indra, but also to the cycles of 17, 18, 19, 20, 33 and 57 luni-solar years with intercalary months varying from 6 to 21 suns, cows or 'Prathamajas' than the references found in the Daniel and other books. Accordingly there is no reason why

¹ The number of complete solar eclipses (Sambara's forts) counted by the Vedic poets is ninety nine. Are $99 \times 18 = 1782$ years ?

the Vedic 1,000 and other numbers should not be taken to signify the cycle of eclipses, when such interpretation is, as already shown, not only consistent with and appropriate to, the context; but also satisfactorily clears the obscurities which defy explanation in any other way. Besides this there is also another positive evidence in support of this interpretation. The Vedas themselves couple these numbers with eclipses which in the texts are called sheep, goat, cow, calf or bull. The reason for giving such names to eclipses is the belief that the sacrifice of such animals on the occasion of eclipses will not only appease the wrath of gods causing such eclipses, but also be either sufficient atonement for the sin of man which is believed to be the main cause of eclipses or sufficient ransom or offering to Kravyādas or Yakshas who are believed to cause them.

The list of visible eclipses of a cycle given in the Tait. Āraṇyaka as twice the number of 8 Vasus, 11 Rudras and twelve Visvedevas or Adityas (62 in all) along with a diagram called Ashtāchakra which is identical with the Tāntric Śrichakra is an additional evidence in support of my contention.

For these reasons I trust that Drapsa, the Vedic cycle of eclipses will prove acceptable to Vedic scholars as a genuine and reliable historical fact.



Diagrams.

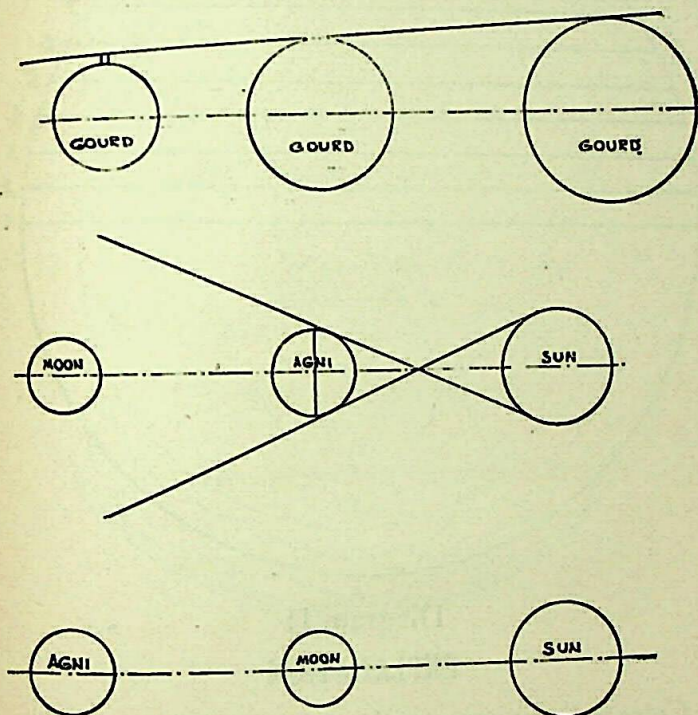


Diagram I

EXPLANATION

- I. Of the three figures, those at the top and bottom are lute-sticks with gourds on a line.

That in middle shows eclipse of the moon,

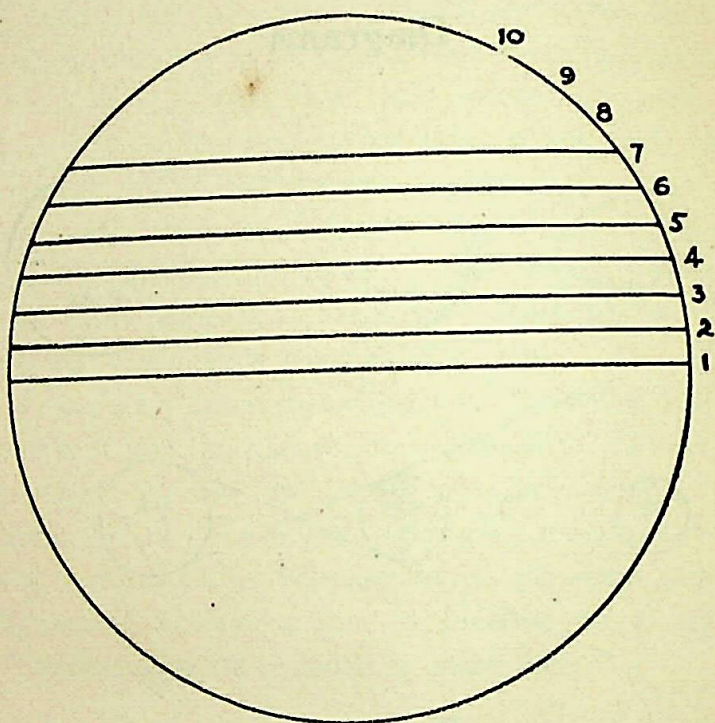


Diagram II

EXPLANATION

- II. Celestial Sphere with seven monthly circles, one Tripāth circle, and one Apāth circle at the top.
1. Sa, Peacock, Bhūh, Jambūdīvā, Lavaṇa-Samudra.
 2. Rī, Kine, Bhuvah, Plakshadvīpa, Ikshu-Samudra.
 3. Ga, Goats and Sheep, Suvah, Kuśa-dvīpa, Surā-Samudra.
 4. Ma, Krauncha bird, Mahah, Kraunchadvīpa, Sarpis-Samudra.
 5. Pa, Kokila bird, Janah, Śākadvīpa, Dadhi-Samudra.
 6. Dha, Horse, Tapah, Śālmalidvīpa, Kshīra Samudra.
 7. Ni, Elephant, Satya, Pushkaradvīpa, Sudhā-Samudra.
 - 8-9. Tripāth, a day of six months and night of six months.
 10. Apāth, always shining with Kaśyapa's light.

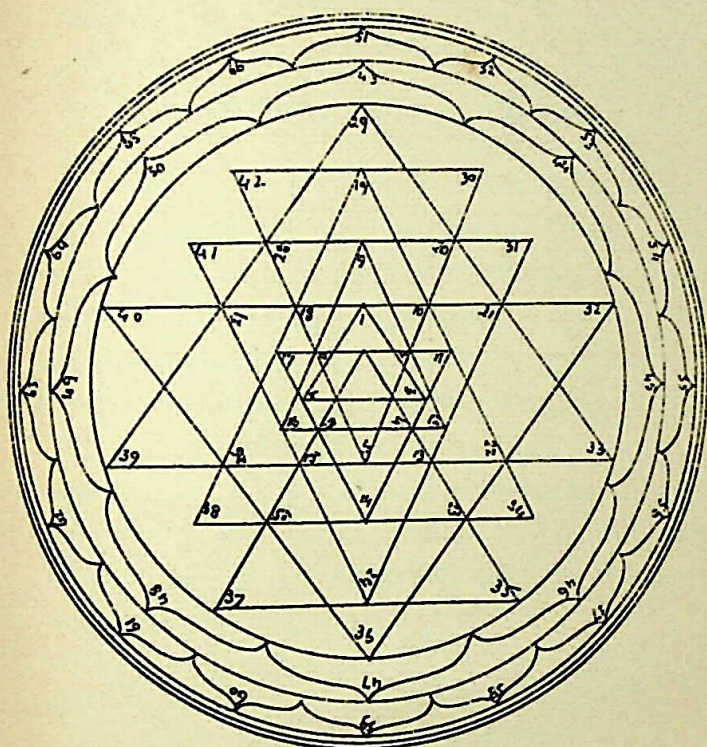


Diagram III

EXPLANATION

III. Śrīchakra of 72 Koṣas or angles—

Vasu-koṣas	.....	1— 8
Two Daśakoṣas	....	9—24
Chaturdaśa Koṣas	.....	29—42
Ashṭa Koṣas	.....	43—50
Shoḍaśa Koṣas	.....	51—66
Three Vrittis	.....	67—69
Bhūpuratraya	70—72

Note—The angles in the original are marked with letters of the alphabet.

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